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Montana
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research report

part 2: THE INDUSTRIES OF MONTANA

Volume 1, Chapters 1-2

Agriculture
The Mineral Industries

Maxine C. Johnson

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Volume 1, Chapters 1-2

Agriculture
The Mineral Industries

Maxine C. Johnson

JUNE 1970

Montana Economic Study
Research Report

Project No. Montana P-31

Prepared under agreement for the Montana State Department of Planning and Economic Development, Montana State Water Resources Board and the University of Montana. The preparation of this document was financed in part through the Urban Planning Grant from the Department of Housing and Urban Development, under the provisions of Section 701 of the Housing Act of 1954, as Amended.

University of Montana
School of Business Administration
Bureau of Business and Economic Research

1970

FOREWORD

Part 1 of the Montana Economic Study described Montana's economy in great detail, with emphasis on population, employment, and income. It also presented projections for 1980. Part 1 had less to say about individual Montana industries.

Part 2 of the Economic Study concerns itself with each of the major industry groups: agriculture and the mineral industries in volume 1; manufacturing and construction in volume 2; and the trade, service, and finance industries, the transportation, communication, and public utilities industries, and government in volume 3. In each instance, the impact of the industry on the state economy and its probable contribution to the future development of Montana is discussed. Special attention is given to employment and earnings: How much employment does the industry provide and how well paid are its workers? How does the industry affect Montanans? What benefits does it provide and what problems, if any, does it create?

Considerable statistical documentation is included to substantiate each industry's past and projected contributions to Montana's economy. We have tried, however, to put the emphasis on people and their jobs.

PART 2

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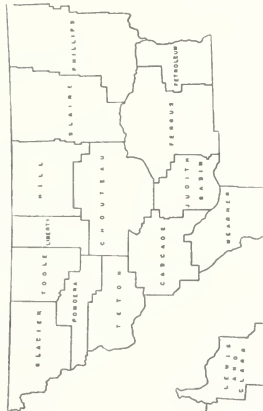
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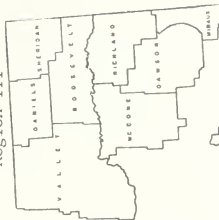
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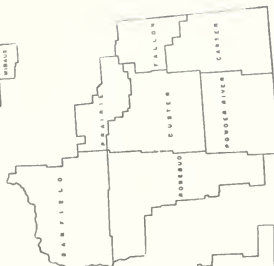
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CHAPTER 1

AGRICULTURE

During most of Montana's history, agriculture has been the state's major economic activity. Prospectors and miners came before the farmer and the livestock man, but it was the latter who came in greater numbers, built homes and communities, and settled the state.

For many years, farming and ranching employed more people and provided more income than any other industry. In 1920, there were 82,000 persons--38 percent of the employed labor force--engaged in agricultural work; 225,000 people--41 percent of the total population--lived on farms and ranches in Montana. But this was the high point. Beginning almost immediately after 1920 the readjustment--which is still in progress--began. Fifty thousand people left Montana farms between 1920 and 1940; 70,000 more between 1940 and 1960. Farm population in 1960 was reported at 105,600, or 16 percent of the total; employment had fallen to 39,500 or 17 percent of the employed labor force (table 1.1). The decline has continued since 1960.

TABLE 1.1

Rural Farm Population and Farm Employment, Montana, 1900-1969

Year	Rural Farm Population ^a		Farm Employment ^{a,b}	
	Number	Percentage of Total Population	Number	Percentage of Total Employment
1900	NA		27,531	24.0
1910	NA		53,411	29.9
1920	225,389 ^c	41.1	81,798	38.2
1930	203,962	37.9	79,678	36.8
1940	175,707	31.4	58,973	31.9
1950	135,939	23.0	54,029	24.8
1960	105,598 ^d	15.6	39,479 ^d	17.1
1969	NA		32,900 ^e	13.0

Sources: [Employment (number), 1900] U.S. Department of Commerce and Labor, Bureau of the Census, Occupations at the Twelfth Census (Washington, D.C.: U.S. Government Printing Office, 1904), table 32, p. 104.

[Employment (number), 1910] U.S. Department of Commerce, Bureau of the Census, Thirteenth Census of the United States, Taken in the Year 1910: Population, 1910, Occupation Statistics, vol. 4 (Washington, D.C.: U.S. Government Printing Office, 1914), table 2, p. 111.

[Employment (number), 1920] U.S. Department of Commerce, Bureau of the Census, Fourteenth Census of the United States, Taken in the Year 1920: Population, 1920, Occupations, vol. 4 (Washington, D.C.: U.S. Government Printing Office, 1923), table 15, p. 75.

[Population (number), 1920] U.S. Department of Commerce, Bureau of the Census, Sixteenth Census of the United States: 1940, Population, Characteristics of the Population, Minnesota-New Mexico, vol. 2, pt. 4 (Washington, D.C.: U.S. Government Printing Office, 1943), table 1, p. 477.

[Employment (number), 1930] U.S. Department of Commerce, Bureau of the Census, Fifteenth Census of the United States: 1930, Population, Montana-Wyoming, vol. 3, pt. 2 (Washington, D.C.: U.S. Government Printing Office, 1932), table 10, p. 15.

[Population (number), 1930-1950] U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: 1950, Characteristics of the Population, Montana, General Characteristics, vol. 2, pt. 26 (Washington, D.C.: U.S. Government Printing Office, 1952), table 13, p. 26-21.

[Population (number), 1960; Employment (Number), 1940-1960] U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: 1960, Montana, General Social and Economic Characteristics (Washington, D.C.: U.S. Government Printing Office, 1961), tables 37 and 62, pp. 28-87 and 28-106.

[Employment (number), 1969] Employment Security Commission of Montana and U.S. Department of Labor, Bureau of Labor Statistics, Montana Civilian Work Force (Helena, Montana, January 15, 1970).

NA denotes that the data are not available.

Blank denotes that it is not applicable.

^aAs of April 1 census date.

^bFor the years 1900-1930, the data cover persons 10 years of age and older; for the years 1940-1960 and 1969, the data cover persons 14 years of age and older.

^cAs of January 1.

^dThese statistics are based on a 25-percent sample of the population rather than a complete count of the population.

^eAs of April 15.

Yet it was only recently that agriculture relinquished its position as Montana's number one employer. The 1960 Census was the first to report higher employment in other Montana industries; both the service industry and the retail trade groups exceeded farm and ranch employment in that year. Income from agriculture, which during some years in the 1940s amounted to one-third of total personal income in the state, contributed only 10 to 13 percent during the five years 1964-1968. These figures are almost certain to decline further in the future.

These experiences, of course, are not unique to Montana; the patterns have been the same throughout the United States. The differences have been in extent rather than direction of change; since 1940 agricultural employment has been declining at a slower rate in the state (figure 1.1). The employment data in figure 1.1 are plotted against logarithmic vertical scales, so that equal slopes denote equal rates of change.

Montana traditionally has been more heavily dependent on agriculture than many other states. Thus, changes in the fortune of its farmers and ranchers have had a greater economic impact on the state. At the same time, Montana agriculture, with all its problems, has been more prosperous than agriculture in many parts of the country. Because of this, it has not had the overwhelmingly depressing effect on the Montana economy that it has in some other states.

Montana agriculture, important as it is to the state economy, accounted for only 1 percent of all cash receipts from farm marketings in the United States in 1969. It may surprise some readers to learn that Montana ranked only thirty-third among the states in total cash receipts from farm marketings in 1969, having been exceeded by states

FIGURE 1.1
Agricultural Employment, Montana and
the United States
1900-1969



Sources: [Montana, 1900] U.S. Department of Commerce and Labor, Bureau of the Census, Occupations at the Twelfth Census (Washington, D.C.: U.S. Government Printing Office, 1904), table 32, p. 104.

[Montana, 1910] U.S. Department of Commerce, Bureau of the Census, Thirteenth Census of the United States, Taken in the Year 1910: Population, 1910, Occupation Statistics, vol. 4 (Washington, D.C.: U.S. Government Printing Office, 1914), table 2, p. 111.

[Montana, 1920] U.S. Department of Commerce, Bureau of the Census, Fourteenth Census of the United States, Taken in the Year 1920: Population, 1920, Occupations, vol. 4 (Washington, D.C.: U.S. Government Printing Office, 1923), table 15, p. 75.

Sources (Continued)

[Montana, 1930] U.S. Department of Commerce, Bureau of the Census, Fifteenth Census of the United States: 1930, Population, Montana-Wyoming, vol. 3, pt. 2 (Washington, D.C.: U.S. Government Printing Office, 1932), table 10, p. 15.

[Montana, 1940-1960] U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: 1960, Montana, General Social and Economic Characteristics (Washington, D.C.: U.S. Government Printing Office, 1961), table 62, p. 28-106.

[Montana, 1969] Employment Security Commission of Montana and U.S. Department of Labor, Bureau of Labor Statistics, Montana Civilian Work Force (Helena, Montana: January 15, 1970).

[United States, 1900-1930] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1960, 81st edition (Washington, D.C.: U.S. Government Printing Office, 1960), table 261, p. 204.

[United States, 1940-1960] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1966, 87th edition (Washington, D.C.: U.S. Government Printing Office, 1966), table 307, p. 218 (U.S. Department of Labor, Bureau of Labor Statistics).

[United States, 1969] U.S. Department of Commerce, Office of Business Economics, "Current Business Statistics," Survey of Current Business, vol. 50, no. 1 (January 1970), p. S-14.

Notes: All employment data for the years 1900 to 1930 cover persons 10 years old and over; all data for the years 1940 to 1960 and Montana data for 1969 cover persons 14 years old and over; and United States data for 1969 cover persons 16 years old and over.

The United States data exclude Alaska and Hawaii prior to 1960.

The United States figures are averages of monthly figures. Data for 1940 were adjusted to reflect the changes in definition adopted in January 1957.

Montana data for 1960 are based on a 25-percent sample of the population rather than a complete count.

^aPreliminary. Montana data preliminary as of April 15.

one does not usually think of as "farm states," such as New York, Pennsylvania, and Florida where a more intensive type of agriculture is practiced.¹

A Brief History

Commercial farming first began in the mountain valleys of western Montana, where beef, grain, and other foods were produced for the early mining towns. Water was plentiful in western Montana and irrigation was used from the beginning.²

Soon cattlemen began to operate east of the mountains. By the 1880s--assisted by the completion of the Northern Pacific Railroad--a rather large-scale open range livestock industry, involving both cattle and sheep, had developed. Many of these operations were controlled by eastern, and sometimes European, capital. Often they were speculative investments, attracted by such books as The Beef Bonanza, or How to Get Rich on the Plains, written by a U.S. Cavalry officer once stationed in Montana and published in 1881. The blizzards of 1886-87 with their heavy losses of livestock discouraged many of the out-of-state investors and afterward Montana's livestock industry tended more toward smaller family-operated units. In addition, lack of capital, horsedrawn equipment, and federal land policies which attempted to limit individual land holdings forced many families to attempt to operate on acreage far too small for the Great Plains area.

1. U.S. Department of Agriculture, Economic Research Service, Farm Income Situation, FIS 215 (February 1970), table 6, p. 11.

2. This brief history is based in part on Merrill G. Burlingame and K. Ross Toole, A History of Montana, vol. 1, chapters 12 and 13 (New York: Lewis Historical Publishing Company, Inc., 1957), pp. 281-340.

Farming activities did not take hold in the dryland areas of eastern Montana till the early 1900s. After the Enlarged Homestead Act of 1909 (providing for 320-acre rather than 160-acre units) was passed by Congress, a flood of settlers began to arrive, many of them solicited by Montana railroads. The story of how these people settled on small acreages, destroyed the grass by plowing, and attempted to raise wheat as they had in the midwest--and of the disastrous consequences for many settlers--is well known. Most experts agree that the small size of farm and ranch units, plus farming methods unsuited to Montana's soil and climate were responsible for the depletion of soil resources and ended in the deserted farms which came to be a symbol of the twenties and thirties in Montana. Some of the effects of these practices can still be seen: the deserted, falling-down shacks, the many still-too-small farm units, and the rundown communities originally established to serve the surrounding farm areas which lost their reason for existence when the farmers fled.

Between 1900 and 1920, thousands of homesteaders poured into Montana. By 1920, there were almost 58,000 farms and ranches in the state (table 1.2). The major products were wheat, beef cattle, and sheep. The average size of ranch was just over 600 acres (table 1.2); total employment was 82,000 (table 1.1). The boom collapsed in the 1920s, with the drought which began in 1919, the wind erosion which followed, and the drop in farm prices. During the years 1921-1925, 20,000 farm and ranch mortgages were foreclosed.³ The number of farm units operating in 1925 was 11,000 less than in 1920 (table 1.2). This was readjustment with a vengeance. The consolidation

3. R. R. Renne, Montana Farm Foreclosures, Montana Agricultural Experiment Station, Bulletin 368 (Bozeman, Montana: Montana State College [now Montana State University], 1939), p. 3.

TABLE 1.2
Number of Farms and Land in Farms
Montana, 1920-1964

<u>Year</u>	<u>Number of Farms</u>	<u>Average Size of Farm (acres)</u>	<u>Total Land in Farms (acres)</u>
1920	57,677	608	35,070,656
1925	46,904	698	32,735,723
1930	47,495	940	44,659,152
1935	50,564	940	47,511,868
1940	41,823	1,111	46,451,594
1945	37,747	1,557	58,787,318
1950	35,085	1,689	59,247,434
1954	33,061	1,859	61,468,903
1959	28,959	2,213	64,081,391
1964	27,020	2,436	65,833,760

Sources: [1920-1925] U.S. Department of Commerce, Bureau of the Census, U.S. Census of Agriculture: 1950, Counties and State Economic Areas, Montana, vol. 1, pt. 27 (Washington, D.C.: U.S. Government Printing Office, 1952), table 1, p. 3.

[1930-1964] U.S. Department of Commerce, Bureau of the Census, U.S. Census of Agriculture: 1964, Statistics for the State and Counties, Montana, vol. 1, pt. 38 (Washington, D.C.: U.S. Government Printing Office, 1967), table 1, p. 7.

of small units into larger ones was accelerated by the increasing availability of power machinery which made it possible to farm larger units with fewer workers.

After a brief recovery in the mid-1920s, Montana agriculture faced the depression and drought of the thirties. During the early years of the decade, the state witnessed a large scale return to the farm. Farmers and ranchers were hard up, but so were people in other occupations; no one, so the theory went, was apt to go hungry on a farm. There were 3,000 more farms--unprofitable as they may have been--in Montana in 1935 than in 1930. After 1935, the consolidation of farm units and the population movement out of rural areas resumed. By the end of the decade the state had experienced the largest drop in agricultural employment ever recorded between census years--21,000 fewer persons were at work on farms in 1940 than in 1930 (table 1.1). The great exodus from Montana agriculture was well underway, spurred by drought, depression, and the rapidly increasing use of power machinery.

Agriculture's difficulties throughout the nation in the 1920s and 1930s resulted in another significant development: the establishment of federal programs designed to help maintain farm income. The Montana experience of M. L. Wilson of Montana State University, Bozeman, greatly influenced the nature of the programs. In particular, the emphasis on local participation grew out of earlier experiments in Montana. In general, these programs have been concerned with price supports, production control, and the necessary storage operations for certain farm commodities.⁴

4. Federal farm programs now exist for the following commodities produced in Montana: wheat, a major Montana product, barley, oats, rye, flax seed, corn, dry beans, honey, wool, sugar beets, potatoes, and milk. Programs for other farm products raised in Montana--among them, hogs, chickens, and eggs--have existed in past years.

During the thirties when oversupply seemed to be the problem, federal programs attempted to limit production; World War II brought a demand for increased farm output. At the same time, eastern Montana livestockmen, through the establishment of Cooperative State Grazing Districts--another Montana innovation, were in the process of bringing under their control millions of acres of public lands which still existed as open range.⁵ As a result, approximately 12 million acres were added to the land in farms and ranches in Montana during the war years (table 1.2); mostly they were used for pasture and livestock production. The number of acres increased, but the number of people declined, as a good many rural residents appear to have been attracted by nonfarm jobs, particularly in war production industries. Between 1940 and 1945 agricultural employment continued to decline, as farm people joined the movement out of Montana to the industrial centers.

For those who stayed on the farm, the war years and immediate post-war years, up to about 1953, appear to have been among the most prosperous ever experienced by farmers and ranchers. The demand for both beef and wheat--which together accounted for from two-thirds to three-fourths of total cash receipts--was strong and high support prices were in effect for wheat. It was a period of generally favorable weather and good prices. Farm income usually amounted to from 25 to 35 percent of Montana's total personal income in the forties and early fifties (table 1.3); income per farm in 1950 and 1951 averaged over \$7,200 in 1958 dollars (table 1.4).⁶

5. Layton S. Thompson, Montana Cooperative State Grazing Districts in Action, Agricultural Experiment Station, Bulletin 481 (Bozeman, Montana: Montana State College [now Montana State University], 1951).

6. Estimates of income per farm during the 1940s are not available.

TABLE 1.3

Personal Income Originating on Farms
Montana, 1950-1968

<u>Year</u>	<u>Total Personal Income (\$000,000)</u>	<u>Farm Income (\$000,000)</u>	<u>Farm Income as Percentage of Total Personal Income</u>
1950	962	260	27
1951	1,049	279	27
1952	1,075	226	21
1953	1,096	230	21
1954	1,079	200	19
1955	1,178	218	18
1956	1,241	199	16
1957	1,297	210	16
1958	1,371	253	18
1959	1,345	171	13
1960	1,383	180	13
1961	1,371	116	8
1962	1,581	267	17
1963	1,588	215	14
1964	1,593	170	11
1965	1,724	204	12
1966	1,875	251	13
1967	1,932	208	11
1968	2,039	212	10

Sources: [Total personal income] U.S. Department of Commerce, Office of Business Economics, "Total and Per Capita Personal Income by Regions and States, 1968," Survey of Current Business, vol. 49, no. 8 (August 1969), table 1, p. 14.

[Farm income] U.S. Department of Commerce, Office of Business Economics, unpublished data (Washington, D.C., November 1969).

TABLE 1.4

Net Income Per Farm, Montana, 1950-1968

Year	Total Net Income per Farm ^a	Index of Prices Paid for Commodities Used, in Family Living ^b (1958 = 100)	Total Net Income per Farm in 1958 Dollars
1950	\$6,153	85	\$7,239
1951	6,630	91	7,286
1952	5,226	92	5,680
1953	5,539	93	5,956
1954	4,716	94	5,017
1955	5,335	94	5,676
1956	4,959	95	5,220
1957	5,309	98	5,417
1958	6,677	100	6,677
1959	4,319	100	4,319
1960	4,714	102	4,622
1961	2,798	102	2,743
1962	7,947	103	7,716
1963	6,300	103	6,117
1964	4,923	105	4,689
1965	6,258	107	5,849
1966	7,834	110	7,122
1967	6,226	111	5,609
1968	6,696	116	5,772

Sources: [Total net income per farm] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1968, Supplement to July 1969, Farm Income Situation, FS 214 (August 1969), table 5, pp. 10-11.

[Index of prices paid, 1950-1957] Maurice C. Taylor, P. J. Creer, and R. D. Rawson, Prices Received and Prices Paid by Montana Farmers and Ranchers--1949-1958, Montana Agricultural Experiment Station and U.S. Department of Agriculture, Agricultural Marketing Service, Bulletin 554 (Bozeman, Montana: Montana State College [now Montana State University] 1960), table 47, p. 19.

[Index of prices paid, 1958] Maurice C. Taylor, P. J. Creer, and R. D. Rawson, Prices Received and Prices Paid by Montana Farmers and Ranchers--1958-1960, Montana Agricultural Experiment Station and U.S. Department of Agriculture, Agricultural Marketing Service, Bulletin 563 (Bozeman, Montana: Montana State College [now Montana State University], 1962), table 47, p. 12.

Sources (Continued)

[Index of prices paid, 1959-1968] Maurice C. Taylor, Frasier T. Galloway, and John E. Cochrane, Prices Received and Prices Paid by Montana Farmers and Ranchers: 1959-1968, Montana Agricultural Experiment Station, Bulletin 636 (Bozeman, Montana: Montana State University, 1970), table 43, p. 19.

^aIncludes changes in inventories and represents income of farm operators--return on labor and capital.

^bThis index series was converted to a 1958 base from the 1947-49 base used for the original index series obtained in the sources cited for this table.

General prosperity and optimism prevailed in Montana. The basis for future problems existed, but many farmers and ranchers were doing well. They were buying new equipment, building new homes, living well. This, of course, had a salutary effect on towns and cities throughout the state. The imminent declines in employment in nonfarm industries such as mining and smelting were not yet evident. Nor was it fashionable in those days to worry about poverty, rural or urban, and other socioeconomic problems. Thus, if one makes only a surface appraisal, it is possible for many Montanans, particularly rural residents, to look back to the period just after World War II with considerable nostalgia.

In 1952, livestock prices (both cattle and sheep) began to decline. They continued to decline until 1956 (figure 1.2). In that year, the average selling prices of beef cattle and calves were less than half the 1951 figures. Marketings had increased--indeed an oversupply of beef brought about much of the price decline--and this helped maintain cash receipts. Nevertheless, it was a difficult time for Montana cattlemen.

Wheat farmers had their problems, too. During World War II, support prices for wheat had been increased and acreages had been expanded as the large wheat stocks accumulated during the 1930s disappeared. After the war, high fixed supports--generally at 90 percent of parity--were maintained. These supports were accompanied by not very successful attempts to limit production through marketing quotas, but during the Korean War, when demand again increased, these production limitations were removed.

After 1953, with the end of the Korean War, controversy over levels of price supports--high and fixed versus flexible levels--increased, focusing on huge surpluses of some farm commodities, including wheat.



Sources: [Marketings and cash receipts, 1950-1951] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 8 (Helena, Montana, 1960), p. 86.

[Marketings and cash receipts, 1952-1953] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 9 (Helena, Montana, 1962), p. 69.

[Marketings and cash receipts, 1954-1955] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 10 (Helena, Montana, 1964), p. 69.

[Marketings and cash receipts, 1956] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 11 (Helena, Montana, 1967), p. 63.

[Marketings and cash receipts, 1957-1967] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 12 (Helena, Montana, 1968), p. 66.

[Marketings and cash receipts, 1968] U.S. Department of Agriculture, Statistical Reporting Service, Crop Reporting Board, Meat Animals: Farm Production, Disposition, and Income, by States, 1968-1969 (Washington, D.C.: U.S. Government Printing Office, 1970), p. 5.

[Price, 1950-1957] Maurice C. Taylor, P. J. Creer, and R. D. Rawson, Prices Received and Prices Paid by Montana Farmers and Ranchers--1949-1958, Montana Agricultural Experiment Station, Bulletin 554 (Bozeman, Montana: Montana State College [now Montana State University], 1960), table 32, p. 13.

[Price, 1958] Maurice C. Taylor, P. J. Creer, and R. D. Rawson, Prices Received and Prices Paid by Montana Farmers and Ranchers--1958-1960, Montana Agricultural Experiment Station, Bulletin 563 (Bozeman, Montana: Montana State College [now Montana State University], 1962), table 32, p. 8.

[Price, 1959-1968] Maurice C. Taylor, Frasier T. Galloway, and John E. Cochrane, Prices Received and Prices Paid by Montana Farmers and Ranchers, 1959-1968, Montana Agricultural Experiment Station, Bulletin 636 (Bozeman, Montana: Montana State University, 1970), table 28, p. 12.

Note: Price is for beef cattle only.

^aExcludes interfarm sales and custom slaughter for farmers.

^bIncludes receipts from marketings and from sales of farm-slaughtered meat.

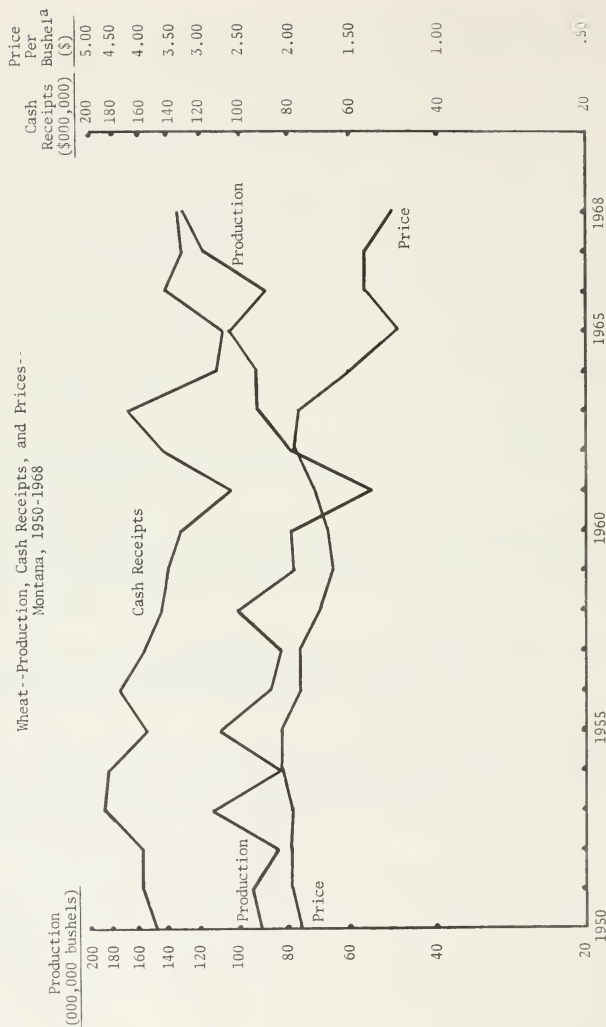
In general, flexible supports became the rule and, beginning in 1955, with the exception of only a few years, wheat prices have declined as supports have been lowered (figure 1.3). These changes were accompanied by new attempts on the part of the federal government to limit production. Such efforts always involved reducing acreages; but reduced acreages could not control production in the face of increased use of capital equipment, heavier application of fertilizer, and other methods of increasing output per acre. As a result, wheat surpluses continued to grow until 1962. About that time, a combination of reduced acreage allotments and increased exports, mostly at public expense, did begin to reduce surplus stocks of wheat.

"Price-cost squeeze" came to be a common term in agricultural circles after 1952. Figure 1.4 illustrates its meaning very well: increasing costs of production, as indicated by rising prices of items farmers must buy, combined with selling prices well below the 1950-1952 level equal a price-cost squeeze. This situation helped to perpetuate the long-established population movement out of agriculture, and resulted in further consolidation of farm and ranch units and continued substitution of capital equipment for labor.

Between 1950 and 1960, agricultural employment in Montana declined by 13,600 persons, or 25 percent (table 1.5). Most of the decrease occurred among farm operators and family members; their numbers dropped by 12,800, or 33 percent, while hired workers decreased by only 800, or 5 percent. The effect on rural areas was evident in the results of the 1960 Census: 24 of Montana's 56 counties, all but 2 of them rural areas with no urban population, experienced declines in number of

FIGURE 1.3

Wheat-Production, Cash Receipts, and Prices--
Montana, 1950-1968



Sources: [Cash receipts, 1950] U.S. Department of Agriculture, Bureau of Agricultural Economics, The Farm Income Situation, FIS 136 (June-July 1952), table 11, p. 28.

[Cash receipts, 1951] U.S. Department of Agriculture, Bureau of Agricultural Economics, The Farm Income Situation, FIS 142 (July-August 1953), table 11, p. 28.

[Cash receipts, 1952] U.S. Department of Agriculture, Agricultural Marketing Service, The Farm Income Situation, FIS 148 (September 1954), table 12, p. 32.

[Cash receipts, 1953] U.S. Department of Agriculture, Agricultural Marketing Service, The Farm Income Situation, FIS 154 (September 1955), table 12, pp. 34 and 35.

[Cash receipts, 1954] U.S. Department of Agriculture, Agricultural Marketing Service, The Farm Income Situation, FIS 160 (September 1956), table 19, pp. 63 and 64.

[Cash receipts, 1955] U.S. Department of Agriculture, Agricultural Marketing Service, The Farm Income Situation, FIS 165 (September 1957), table 20, p. 61.

[Cash receipts, 1956] U.S. Department of Agriculture, Agricultural Marketing Service, The Farm Income Situation, FIS 170 (September 1958), table 18, p. 67.

[Cash receipts, 1957] U.S. Department of Agriculture, Agricultural Marketing Service, The Farm Income Situation, FIS 175 (September 1959), table 10, pp. 52 and 53.

[Cash receipts, 1958] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1959, Supplement to July 1960, Farm Income Situation, FIS 179 (August 1960), table 10, pp. 82 and 83.

[Cash receipts, 1959] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1960, Supplement to July 1961, Farm Income Situation, FIS 183 (August 1961), table 7, p. 87.

[Cash receipts, 1960] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1961, Supplement to July 1962, Farm Income Situation, FIS 187 (August 1962), table 10, pp. 105 and 106.

[Cash receipts, 1961] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1962, Supplement to July 1963, Farm Income Situation, FIS 191 (August 1963), table 10, pp. 105 and 106.

[Cash receipts, 1962] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1963, Supplement to July 1964, Farm Income Situation, FIS 195 (August 1964), table 10, pp. 103 and 104.

[Cash receipts, 1963] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1964, Supplement to July 1965, Farm Income Situation, FIS 199 (August 1965), table 16, p. 115.

[Cash receipts, 1964] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1965, Supplement to July 1966, Farm Income Situation, FIS 203 (August 1966), table 18, pp. 119 and 120.

Sources (Continued)

[Cash receipts, 1965] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1967, Supplement to July 1968, Farm Income Situation, FIS 211 (August 1968), table 11, pp. 111 and 112.

[Cash receipts, 1966-1968] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1968, Supplement to July 1969, Farm Income Situation, FIS 214 (August 1969), table 11, p. 115.

[Price, 1950-1957] Maurice C. Taylor, P. J. Creer, and R. D. Rawson, Prices Received and Prices Paid by Montana Farmers and Ranchers--1949-1958, Montana Agricultural Experiment Station, Bulletin 554 (Bozeman, Montana: Montana State College [now Montana State University], 1960), table 15, p. 8.

[Price, 1958] Maurice C. Taylor, P. J. Creer, and R. D. Rawson, Prices Received and Prices Paid by Montana Farmers and Ranchers--1958-1960, Montana Agricultural Experiment Station, Bulletin 563 (Bozeman, Montana: Montana State College [now Montana State University], 1962), table 15, p. 5.

[Price, 1959-1968] Maurice C. Taylor, Frasier T. Galloway, and John E. Cochrane, Prices Received and Prices Paid by Montana Farmers and Ranchers, 1959-1968, Montana Agricultural Experiment Station, Bulletin 636 (Bozeman, Montana: Montana State University, 1970), table 13, p. 8.

[Production, 1950-1953] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 8 (Helena, Montana, 1960), p. 15.

[Production, 1954-1956] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 10 (Helena, Montana, 1964), p. 19.

[Production, 1957-1958] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 11 (Helena, Montana, 1967), p. 17.

[Production, 1959-1966] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 12 (Helena, Montana, 1968), p. 21

[Production, 1967-1969] U.S. Department of Agriculture, Statistical Reporting Service, and Montana Department of Agriculture, Montana Crop Production--1969 (Helena, Montana, December 24, 1969).

^aAnnual average.

FIGURE 1.4

Prices Paid for Commodities Used in Production and Prices Received
for All Farm Products, Montana, 1950-1968
(1947-1949 = 100)



Sources: [1950-1957] Maurice C. Taylor, P. J. Creer, and R. D. Rawson, Prices Received and Prices Paid by Montana Farmers and Ranchers--1949-1958, Montana Agricultural Experiment Station and U.S. Department of Agriculture, Agricultural Marketing Service, Bulletin 554 (Bozeman, Montana: Montana State College [now Montana State University], 1960), tables 1 and 48, pp. 4 and 20.

[1958] Maurice C. Taylor, P. J. Creer, and R. D. Rawson, Prices Received and Prices Paid by Montana Farmers and Ranchers--1958-1960, Montana Agricultural Experiment Station and U.S. Department of Agriculture, Agricultural Marketing Service, Bulletin 563 (Bozeman, Montana: Montana State College [now Montana State University], 1962), tables 1 and 48, pp. 3 and 12.

[1959-1968] Maurice C. Taylor, Frasier T. Galloway, and John E. Cochrane, Prices Received and Prices Paid by Montana Farmers and Ranchers: 1959-1968, Montana Agricultural Experiment Station, Bulletin 636 (Bozeman, Montana: Montana State University, 1970), tables 1 and 42, pp. 4 and 18.

^aPreliminary.

residents ranging from 1.5 to 18.8 percent over the decade. The main streets of many a small town began to be deserted; young people left as jobs disappeared. These ramifications are discussed in greater detail in the chapter on retail trade.

Because Montana's urban areas were not able to provide jobs for all of the migrants from rural areas, plus new workers and the unemployed from other declining industries (chiefly mining and railroads), a considerable exodus to other states occurred during the fifties. The net loss through out-migration was estimated at approximately 25,000 people. Unfortunately many of the out-migrants were among the younger and better-educated age groups. This has been a cause of concern for many Montanans. Yet if these young people had stayed, they would have faced higher unemployment and lower incomes. Looked at in this way, the loss of population becomes a little less distressing.

Since 1960, the drop in farm population and employment has continued, but apparently at a slower rate. Rough estimates prepared by the Bureau of Business and Economic Research (with 1960 as the last census benchmark year) indicate that there were approximately 5,500 fewer workers in 1968, a loss of 14 percent over the 8 years, as the substitution of capital for labor continued (table 1.5). Again, the decline occurred mostly among farm operators and their families. The number of hired workers was approximately the same in 1968 as in 1960.

The increase in output per worker in American agriculture since World War II has been truly remarkable, and should be emphasized in any discussion of the agricultural sector. Much has been made of technological advances and increases in output in other industries;

TABLE 1.5
Montana Farm Employment
1950-1968

<u>Year</u>	<u>Family Employment</u>	<u>Hired Workers</u>	<u>Total Employment</u>
1950	37,800	15,000	52,800
1951	35,500	15,200	50,700
1952	34,600	14,900	49,500
1953	34,300	14,600	48,900
1954	32,000	15,200	47,200
1955	29,900	14,300	44,200
1956	30,200	14,200	44,400
1957	27,800	14,700	42,500
1958	27,100	14,100	41,200
1959	26,700	13,900	40,600
1960	25,000	14,200	39,200
1961	24,600	12,800	37,400
1962	24,500	13,800	38,300
1963	24,000	14,000	38,000
1964	23,600	13,200	36,800
1965	22,800	12,600	35,400
1966	22,100	15,300	37,400
1967	20,300	16,100	36,400
1968	19,700	14,000	33,700

Source: Estimated by the Bureau of Business and Economic Research (Missoula, Montana, 1969); data based on original material from U.S. Department of Agriculture, Agricultural Marketing Service, Farm Employment, Statistical Bulletin no. 236 (Washington, D.C.: U.S. Government Printing Office, 1958); and U.S. Department of Agriculture, Statistical Reporting Service, Farm Labor (February 1959; March issues, 1963-1969).

Note: Average monthly employment.

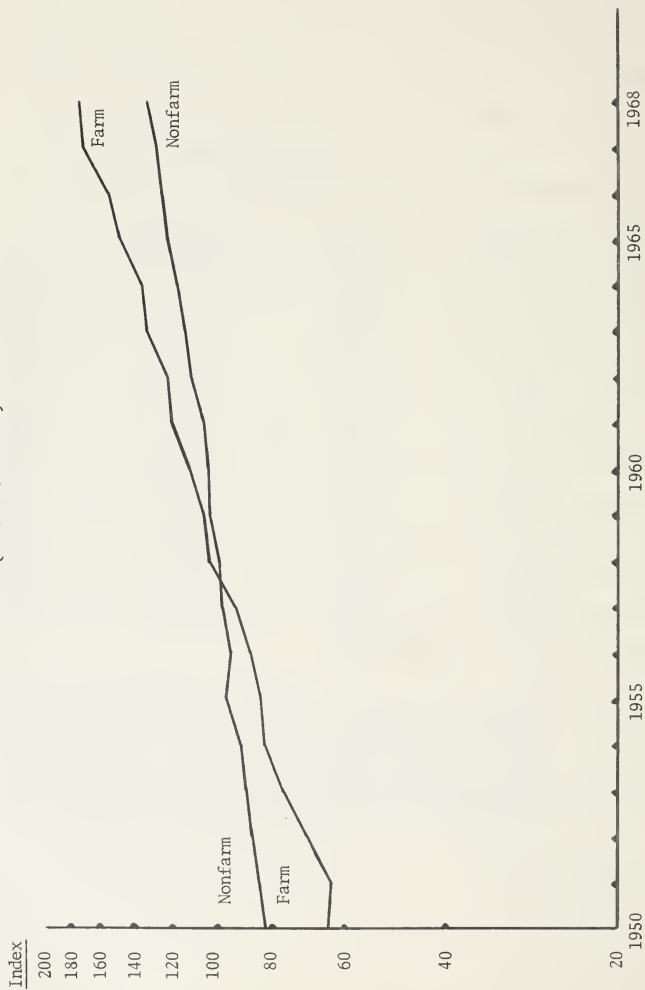
many people may not know that the gain in farm output per man-hour has been considerably greater. The U.S. Department of Labor index of the output per man-hour in all nonfarm industries in the United States has risen from 82.4 in 1950 to 133.3 in 1968 (1957-59 = 100), a gain of 62 percent. Comparable figures for agriculture are 64.1 in 1950 and 174.0 in 1968, or a 171 percent increase (figure 1.5). This dramatically illustrates why farm employment has declined so sharply over the past two decades--if one man today can do nearly as much work as three men did in 1950, the number of available jobs must fall. It should be noted that the increase in labor productivity in the range livestock industry, an important part of Montana's agriculture, was much smaller than in other agricultural activities.

Because the number of farms and ranches, and the number of farm families, has been decreasing, the income of individual families still farming in Montana has not fallen as rapidly as total income. Table 1.4, column 1, shows average net income per farm by years since 1950. In most recent years, income per farm has been equal to 1950 and 1951 averages. In 1968, average income per farm was approximately \$6,700. Only six states had higher averages.

Nevertheless, when one considers that the average value per farm and ranch in Montana was \$103,000 in 1964, \$6,700 is hardly a satisfactory return to capital and labor.⁷ And, when the figures are deflated for increases in the cost of family living, the comparison

7. The figures on value and income are only roughly comparable.

FIGURE 1.5
Output Per Man-Hour in the Private Economy, United States, 1950-1968
(1957-1959 = 100)



Sources: [1951] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1963, 84th edition (Washington, D.C.: U.S. Government Printing Office, 1963), table 308, p. 237. (U.S. Department of Labor, Bureau of Labor Statistics)

[1952-1954] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1964, 85th edition (Washington, D.C.: U.S. Government Printing Office, 1964), table 311, p. 235. (U.S. Department of Labor, Bureau of Labor Statistics)

[1956] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1965, 86th edition (Washington, D.C.: U.S. Government Printing Office, 1965), table 318, p. 236. (U.S. Department of Labor, Bureau of Labor Statistics)

[1957-1959, 1961-1964] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1966, 87th edition (Washington, D.C.: U.S. Government Printing Office, 1966), table 330, p. 237. (U.S. Department of Labor, Bureau of Labor Statistics)

[1966] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1968, 89th edition (Washington, D.C.: U.S. Government Printing Office, 1968), table 329, p. 229. (U.S. Department of Labor, Bureau of Labor Statistics)

[1950, 1955, 1960, 1965, 1967, 1968] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1969, 90th edition (Washington, D.C.: U.S. Government Printing Office, 1969), table 327, p. 226. (U.S. Department of Labor, Bureau of Labor Statistics)

Note: Data exclude Alaska and Hawaii prior to 1960 and are based on labor force reports.

between recent years and the early fifties becomes quite unfavorable (table 1.4, column 3). The growth in income has not been great enough to offset rising prices. Increases in output per worker have gone unrewarded.

On the other hand, these income figures do not reflect increases in the value of farm property, which in recent years have been substantial. Between 1950 and 1964, the average value per acre (land and buildings) increased 151 percent, while the average value per farm increased 263 percent.⁸ One final statement on the farm income figures discussed here: they are averages, and as averages they conceal a very wide range of individual incomes. These income variations will be discussed in greater detail later.

Montana Agriculture Today

In 1968, Montana agriculture employed approximately 33,700 farm and ranch operators and hired workers (13 percent of total employment in the state) (table 1.5); it marketed farm products worth almost \$510 million (table 1.10) and received another \$74 million in government payments;⁹ and it earned a net income (return to farm operators and wages to hired labor) of \$212 million, or 10 percent of total state personal income (table 1.3). Its income per farm was relatively

8. U.S. Department of Commerce, Bureau of the Census, U.S. Census of Agriculture: 1964, Statistics for the State and Counties, Montana, vol. 1, pt. 38 (Washington, D.C.: U.S. Government Printing Office, 1967), table 1, p. 7.

9. U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1968, Supplement to July 1969, Farm Income Situation, FS 214 (August 1969), table 14, p. 135.

high; Montana ranked ninth among the 50 states in total net income per farm.¹⁰ In addition, Montana farm products provided most of the raw materials for a food products manufacturing industry in the state which included meat packing, flour milling, sugar production, and dairies, and employed 4,300 workers in 1968.¹¹

Various parts of the state are far more dependent upon agriculture than others. In Region II--north central Montana, Region III--northeastern Montana, and Region VI--the southeastern corner, farming and ranching remain the major sources of employment and income. In 1966, 26.5 percent of total earnings from participation in the labor force came from farm earnings in Region II; 33.5 percent in Region III; and 32.8 percent in Region VI (table 1.6). In general, these also are the most prosperous agricultural areas of the state.

In the extreme western Montana counties (in Region I), on the other hand, only 3 percent of total earnings came from agriculture. Region IV, which encompasses southwestern Montana, obtained only 7.5 percent of its participation income from agriculture and Region V, south central Montana, less than 13 percent.

The latest complete farm employment figures available by region are from the 1960 Census, as shown in table 1.6. They reflect regional relationships similar to those for agricultural income. The chances are that all these employment figures are significantly smaller in 1970.

10. Ibid., table 5, p. 11.

11. Employment Security Commission, Montana Labor Market: Employees on Montana Nonagricultural Payrolls, 1968, Supplement 1 (Helena, Montana, 1969).

TABLE 1.6

Importance of Agriculture in Montana Economic Regions

Region	Agricultural Employment, 1960		Farm Earnings, 1966	
	Number	Percentage of Total Employment, 1960	Amount (\$'000,000)	Percentage of Total Earnings, 1966
The state	39,479	17.1	248.2	16.5
Region I ^a	4,694	11.1	8.3	3.0
Region II ^b	12,256	21.4	112.6	26.5
Region III ^c	6,266	29.8	48.8	33.5
Region IV ^d	6,252	11.0	24.6	7.5
Region V ^e	6,270	14.9	30.8	12.7
Region VI ^f	3,741	32.5	23.0	32.8

Sources: [Agricultural employment] U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: 1960, General Social and Economic Characteristics, Montana, Final Report PC(1)-28C (Washington, D.C.: U.S. Government Printing Office, 1961), table 85, pp. 28-146 to 28-150.

[Farm earnings] U.S. Department of Commerce, Office of Business Economics, unpublished data (Washington, D.C., February 1970).

Notes: Earnings figures represent income from current participation in the labor force: wages and salaries, other labor income, and proprietors' income.

Totals may not add due to rounding.

Since 1966, the state figure for farm earnings has been revised to \$257 million, or 17 percent of total earnings.

^aIncludes Flathead, Granite, Lake, Lincoln, Mineral, Missoula, Ravalli, and Sanders Counties.

^bIncludes Blaine, Cascade, Chouteau, Fergus, Glacier, Hill, Judith Basin, Liberty, Meagher, Petroleum, Phillips, Pondera, Teton, and Toole Counties.

^cIncludes Daniels, Dawson, McCone, Richland, Roosevelt, Sheridan, Valley, and Wibaux Counties.

^dIncludes Beaverhead, Broadwater, Deer Lodge, Gallatin, Jefferson, Lewis and Clark, Madison, Park, Powell, and Silver Bow Counties.

^eIncludes Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Treasure, Wheatland, and Yellowstone Counties.

^fIncludes Carter, Custer, Fallon, Garfield, Powder River, Prairie, and Rosebud Counties.

As indicated earlier in table 1.1, the proportion of total state employment provided by farms and ranches declined from 17 percent in 1960 to 13 percent in 1969.

Income Distribution

Of the 27,020 farms and ranches reported in the 1964 Census of Agriculture, 22,593 were classified as commercial farms; that is, they had sales of \$2,500 or more in 1964, or they had sales between \$50 and \$2,499 and were operated by a person who was under 65 years of age and who did not work off the farm more than 100 days.¹² The great variation in size of operations is striking: over 5,000 Montana farms and ranches (22 percent) had total sales of less than \$5,000; about the same number 5,400 (24 percent), had sales of over \$20,000. The lowest 1,500 commercial farms had average sales of \$1,220; the top 1,500, average sales of \$81,849 (table 1.7).

Variations in sales also exist from one part of the state to the other. The ranches with the largest sales are east of the Continental Divide, in Regions II, IV, V, and VI. Western Montana, where agriculture is not a major source of income, has a higher proportion of farms and ranches with very small sales (table 1.8).

Many low-income farmers are able to supplement their meager farm incomes with some cash from other sources. This is especially true in western Montana (Region I) where many people farm part of the time and also work off the farm in other jobs. Indeed, the extent of nonfarm income received by all operators of commercial farms and ranches is surprising: in 1964 over 16,100 operators (71 percent) received \$53.2

12. Part-time, part-retirement, and institutional farms and ranches are classified as noncommercial.

TABLE 1.-

Characteristics of Commercial Farms and Ranches by Economic Class, Montana, 1964

Subject	All Commercial Farms	Class I.-Sales of \$40,000 or more	Class II.-Sales of \$20,000 to \$39,999	Class III.-Sales of \$10,000 to \$19,999	Class IV.-Sales of \$5,000 to \$9,999	Class V.-Sales of \$2,500 to \$4,999	Class VI.-Sales of \$50 to \$2,499
<i>Farms, averages, and dollar:</i>							
Number of farms	22,593	1,569	3,860	6,575	5,518	3,522	1,549
Cash-grain farms	8,400	469	1,766	2,977	2,077	1,048	263
Cash-grain farms and ranches	10,405	625	2,255	3,750	2,689	1,384	797
All other	3,553	207	839	842	752	600	489
Average size of farm (acres)	2,650	11,642	3,791	2,247	1,410	842	939
Average value (land and buildings) per farm	\$ 114,217	\$ 410,982	\$ 174,817	\$ 105,038	\$ 65,027	\$ 42,603	\$ 33,362
<i>Farm operators:</i>							
Percentage of farms operated by tenants	12.4	8.9	11.8	13.6	15.5	12.7	11.3
Percentage with nonwhite operators	1.6	0.7	0.6	1.1	1.7	2.8	4.7
Percentage of operators with four years of high school or more	45.5	64.6	53.1	48.3	40.3	36.8	32.9
<i>Off-farm income:</i>							
Percentage of operator households with off-farm income:							
All income	70.9	59.7	64.7	68.2	73.7	82.1	74.3
Wages and salaries	42.1	30.3	32.0	37.7	46.8	55.8	51.5
Net income from business or professional	8.6	8.3	7.5	8.8	9.1	9.4	7.3
Social security, pensions, veteran and welfare payments	17.3	11.0	12.3	13.3	16.6	27.3	26.0
Rent, dividends, interest	38.8	37.8	42.6	42.0	37.2	34.6	32.3
Percentage of operator households with off-farm income greater than value of farm products sold	10.6	0.2	0.4	1.8	7.1	33.2	45.8
Percentage of operator households with off-farm incomes of:							
\$0 to \$1,999	41.3	36.5	44.4	43.7	43.0	31.8	18.7
\$1,500 to \$2,999	20.4	15.5	18.6	22.4	19.2	20.8	23.1
\$3,000 to \$4,999	16.9	15.9	13.9	16.0	18.2	20.7	13.0
\$5,000 and over	21.5	32.1	23.1	17.9	19.6	26.6	17.6
Average off-farm income per farm	\$ 2,341	\$ 3,082	\$ 2,163	\$ 2,037	\$ 2,242	\$ 3,110	\$ 2,407
<i>Value of products sold:</i>							
Total	\$382,683,717	\$128,421,557	\$105,142,501	\$95,000,039	\$40,608,396	\$12,929,901	\$1,894,571
Average per farm	\$ 16,938	\$ 81,849	\$ 27,238	\$ 14,250	\$ 7,359	\$ 3,672	\$ 1,230
All crops	\$170,166,609	\$46,388,616	\$55,234,469	\$39,813,028	\$18,757,600	\$5,924,600	\$61,130
All livestock and poultry	\$212,517,112	\$82,032,941	\$49,908,130	\$55,186,976	\$21,850,793	\$7,005,300	\$1,207,468

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Agriculture, 1964, Statistics for the State and Counties, Montana, vol. 1, pt. 38 (Washington, D.C.: U.S. Government Printing Office, 1967), table 1, pp. 34-39, 41, and 45.

Note: In general, commercial farms included all farms with a value of sales amounting to \$2,500 or more. Farms with a value of sales of \$50 to \$2,499 were included as commercial farms if the farm operator was under 65 years of age and if he did not work off the farm 100 or more days during the year.

TABLE 1.8
Proportion of Commercial Farms in Each Economic Class,
by Regions, Montana, 1964

	Class I--Over \$40,000 in Sales (Percent)	Class II--Sales of \$20,000 to \$39,999 (Percent)	Class III--Sales of \$10,000 to \$19,999 (Percent)	Class IV--Sales of \$5,000 to \$9,999 (Percent)	Class V--Sales of \$2,500 to \$4,999 (Percent)	Class VI--Sales of \$50 to \$2,499 (Percent)
All Commercial Farms (Number)						
The state	22,593	6.9	17.1	29.1	24.4	15.6
Region I	2,847	3.2	8.3	19.3	25.8	26.0
Region II	7,202	8.6	22.3	31.7	21.5	11.5
Region III	4,530	4.4	15.3	31.7	27.6	11.5
Region IV	2,576	9.1	17.6	26.7	24.1	16.0
Region V	5,381	7.7	14.5	29.3	25.4	15.9
Region VI	2,057	8.1	18.4	30.5	24.6	16.3
						12.9
						5.5

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Agriculture: 1964, Statistics for the State and Counties, Montana, vol. 1, pt. 38 (Washington, D.C.: U.S. Government Printing Office, 1967), table 6, pp. 252-257.

Note: In general, commercial farms included all farms with a value of sales amounting to \$2,500 or more. Farms with a value of sales of \$50 to \$2,499 also were included as commercial farms if the farm operator was under 65 years of age and if he did not work off the farm 100 or more days during the year.

million in wages and salaries from off-farm employment, from a nonfarm business or profession, from social security, pensions, veterans and welfare payments, or from property income (rent, dividends, and interest). Wages and salaries were the major source of off-farm income; 42 percent of all farm and ranch families (9,561 households) had income from wages and salaries earned off the ranch (table 1.7).

As one might suspect, the nonfarm income did little to offset the variation in income from farm operations (table 1.7). Nevertheless, with its addition, a good many of the families on small farms received adequate total incomes in 1964. Table 1.7 indicates that others did not: 45 percent of Class VI farms and 32 percent of Class V farms received less than \$1,500 from off-farm sources. Even when one considers the nonmonetary income in the form of housing and produce which most farm families receive, it is unlikely that these families received incomes above the poverty level.

It is useless to conjecture, with the limited data available, as to what proportion of Montana farm families may have been living in poverty in 1964. The extent of rural poverty and its prevalence in rural as compared to urban areas, using 1959 data from the 1960 Census of Population, has been documented by Peter C. Lin in Distribution of Income and Its Relation to the Economic Welfare of Montanans, a staff study of the Montana Economic Study. This report points out that 31.8 percent of rural families had money incomes below \$3,000 in 1959. In contrast, only 22.4 percent of rural nonfarm and 15.2 percent of urban families fell below the poverty line of \$3,000. There is little evidence to indicate that farm families have improved their relative position in the last ten years.

The 1964 Census of Agriculture calls Class V and Class VI farms (all of whom had sales of under \$5,000) commercial farms. Nevertheless, for the

remainder of this discussion of present-day Montana agriculture, most of the remarks will be mainly relevant to the larger farms or ranches in Classes I through IV.

Those families on the Class V and VI farms and ranches obviously do not have sufficient resources to earn a decent living in agriculture. Many of them probably receive more than half their income from nonfarm sources (table 1.7). It is also true that these farms and ranches contribute very little to total agricultural production. Although they made up 22 percent of the total farm and ranch units in 1964, their share of total cash receipts from farm marketings was less than 4 percent (table 1.7).

Existing farm programs are not designed to help these people; their problems are not a result of the agricultural market and cannot be corrected by price or production programs. They certainly have not contributed to the national problem of overproduction: theirs is a problem of insufficient individual resources. The very existence of their small units frequently results in underutilization of capital, particularly farm equipment, and underemployment of the farm operator in cases where he does not hold a steady off-the-farm job.

Many of these very small operators probably do not consider themselves primarily farmers or ranchers. In western Montana it seems likely that many rural residents consider their farm income to be supplemental to their earnings in the woods or mills or in other nonfarm employment. The combination of a desire for supplemental income from nonfarm employment, plus a preference for rural life, may well explain the persistence of small farm units in Region I. Unfortunately, not all parts of the state offer the nonfarm employment opportunities in rural areas that

exist in western Montana. Nor are all small farmers in western Montana able to achieve satisfactory incomes; considerable poverty does exist.

The truth is that the only solution for rural poverty in general is for most small operators to shift to other employment. For many farmers and their families, this would represent a difficult adjustment. For some it involves an emotional attachment to rural life; many others face a lack of preparation for any other kind of work. Table 1.7 indicates that only 33 percent of Class VI operators and 37 percent of Class V operators have 4 years of high school education or more. It is pertinent also to note that the percentage of nonwhite operators (mostly Indians), while still small, is significantly higher in these classes. In the majority of cases, the shift to other employment may come only as the young people in rural areas migrate before they become involved in farming and as older operators retire. It is especially important that schools and other public and private agencies serving rural families assist the young people to acquire the education, the skills, and the information about alternative opportunities which will facilitate such a movement. Above all, it is time we recognized the futility of encouraging most farm youth to remain on the farm. But we must also recognize that a conscious policy of encouraging farm migration implies confidence that the nonfarm economy--here or in other states--is capable of absorbing these workers.

Concern for the plight of the farm operator should not allow us to ignore the larger number of hired workers employed on farms and ranches. The average number employed has varied between 12,600 and 16,100 during the 1960s; it is estimated at 14,000 in 1969 (table 1.5). Because

agricultural employment is very seasonal and the figures just quoted are yearly averages, the total number of persons involved is much greater. It includes summer migratory workers, high school and college youths, and other seasonal workers as well as year-round farm employees.

Many of the workers who harvest the wheat, cut the hay, pick the cherries, and work in the beet fields are migratory workers from out of state. The beet workers are mostly Mexican-Americans from Texas brought to Montana by the U.S. Employment Service and/or the sugar companies. Other migratory workers come on their own, moving about the United States with the harvest seasons. Altogether, some 12,000 temporary farm laborers from out of state may be employed in Montana over a year's period. The Montana State Employment Service estimates that during 1969 there were approximately 3,500 workers from out of state employed in the hoeing and thinning of beets and 7,500 more in grain harvesting, haying, and livestock activities.¹³ Ordinarily, some 750 cherry pickers come into the Flathead Lake area to harvest the cherry crop; although, because of a poor crop, these workers did not come in 1969.¹⁴ Of course, as agricultural activities become more mechanized, the demand for these migratory workers declines just as the demand for all farm labor is declining all over the state, and indeed, the nation.

There is little information available about Montana farm workers. We know that they are generally unskilled and unqualified for other,

13. Montana State Employment Service, affiliated with U.S. Employment Service, Montana Farm Labor Report: 1969 (Helena, Montana, 1969), p. 3.

14. Ibid., p. 5.

more lucrative kinds of employment. They earn very low incomes; in 1959 farm laborers were near the bottom of the heap in Montana, with the census reporting median earnings of male farm laborers at \$1,702 for the year, compared to a median of \$4,397 for all male workers. These are cash income figures and do not include income in kind--that is, meals and lodging, which are frequently provided with farm employment. Confirming the seasonality of agricultural employment, the census also reported that only 44 percent of the 10,700 male farm laborers in the state during the census period worked 50 or more weeks in 1959. The 301 females who worked as farm laborers in 1959 had median earnings of \$583; however, only 19 percent of them worked more than 50 weeks.¹⁵ The importance of training rural youth for alternative employment opportunities again is evident.

Land Use

According to the 1964 Census of Agriculture, most of Montana's 65.8 million acres in farms are devoted to dryland farming or grazing; approximately 1.9 million acres are irrigated (table 1.9). It should be noted that the sort of dryland farming practiced today is much more sophisticated and far better suited to Montana soil and climatic conditions than was the case 30 or 40 years ago. Montana farmers and ranchers are obtaining better yields per acre and are conserving their soils for future use. They are still at the mercy of unfavorable weather conditions; if there is any doubt, production and income figures for 1961, the latest severe drought year, should confirm this vulnerability (tables 1.3 and 1.4).

15. U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: 1960, Detailed Characteristics, Montana, Final Report PC (1)-28D (Washington, D.C.: U.S. Government Printing Office, 1961), table 14, pp. 28-243 and 28-244.

TABLE 1.9
Land in Farms According to Use, Montana, 1964

<u>Use</u>	<u>Number of Acres</u>
All land in farms	65,833,760
Irrigated	1,893,360
Croplands, total	15,388,431
Harvested	7,812,612
Used for pastures	1,030,734
Not harvested and not pastured ^a	6,545,085
Woodland, total	2,125,306
Pastured	1,869,971
Not pastured	255,335
Other pasture (not cropland or woodland)	47,376,901
Other land ^b	942,850

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Agriculture: 1964, Statistics for the State and Counties, Montana, vol. 1, pt. 38 (Washington, D.C.: U.S. Government Printing Office, 1967), table 1, p. 7.

Note: Acreages in various uses add to 65,833,488 acres.

^aIncludes cultivated summer fallow.

^bHouse lots, roads, etc.

Irrigation, of course, helps to offset uncertainties of rainfall. From the individual producer's standpoint, it helps increase production and stabilize income. From the national standpoint, however, increases in irrigated land may contribute to greater overproduction. One of the anomalies of federal agricultural policy since farm programs began has been the existence in the same department of some agencies attempting to control production and of other agencies simultaneously promoting irrigation projects and other programs for increasing production.

Most of the irrigated land in Montana is used as pasture and hayland for livestock production; some is used for crop production, especially potatoes and sugar beets. Irrigated crops (including hay) are particularly important in western Montana, Regions I and IV, and south central Montana, Region V.

Different agencies report different amounts of irrigated land in Montana, mostly because they use different definitions. The 1964 Census of Agriculture reports a total of 1.9 million acres of irrigated land (table 1.9); the Montana Department of Agriculture reports 1.5 million acres of irrigated cropland (including hayland) harvested in 1967.¹⁶ The significant thing about the Department of Agriculture figures is that the Department reports fewer irrigated acres harvested in 1967 than in 1950--1.5 million acres compared to 1.7 million acres.

Prospects for increases in irrigated acreage in the next few years depend mostly upon federal policy. As of June 30, 1967, proposed projects by the Bureau of Reclamation included the Jefferson-Whitehall Unit, which

16. Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 12 (Helena, Montana, 1968), p. 8.

would provide full irrigation for 49,600 acres and supplemental water for 14,600 acres, and the smaller West Bench Unit (Beaverhead County) which would provide supplemental water for 6,400 acres.¹⁷ No funds have yet been appropriated for either of these projects. At the present time other national priorities and considerable opposition on the part of environmentalists to projects such as the Reichle Dam and Reservoir on the Big Hole River (the proposed storage unit for the Jefferson-Whitehall project) make additional construction seem unlikely in the near future. The last Bureau of Reclamation irrigation project in Montana--the East Bench Unit in Beaverhead and Madison Counties, completed in 1965--added 21,800 irrigated acres and provided supplemental water to another 28,000 acres.¹⁸ Irrigation is one way of increasing Montana's agricultural production; the state has not begun to realize its potential in irrigated cropland and pastures. Unfortunately, not much change is likely in the next few years.

Production

Montana farms and ranches have two major products: beef and wheat. And although Montanans speak of "wheat farms" and "cattle ranches," many operations combine production of the two commodities. Together, beef cattle and wheat have accounted for about three-fourths of total cash receipts from farm marketings in recent years. Until recently, wheat and cattle receipts usually were approximately equal, although proceeds from wheat sometimes exceeded those for cattle. With the decline in wheat prices beginning in 1964, cattle have assumed greater importance as a source of income (figure 1.6). Cattle and calves have accounted for the largest portion--46 percent of total receipts in 1967 and 51 percent in 1968

17. U.S. Department of the Interior, Bureau of Reclamation, Summary Report of the Commissioner and Statistical Appendix: 1968, pt. 2 (Washington, D.C.: U.S. Government Printing Office, 1969), p. 152.

18. Ibid., pt. 4, p. 179.

(table 1.10). This is true even though wheat production in 1967 and 1968 was the highest ever recorded.

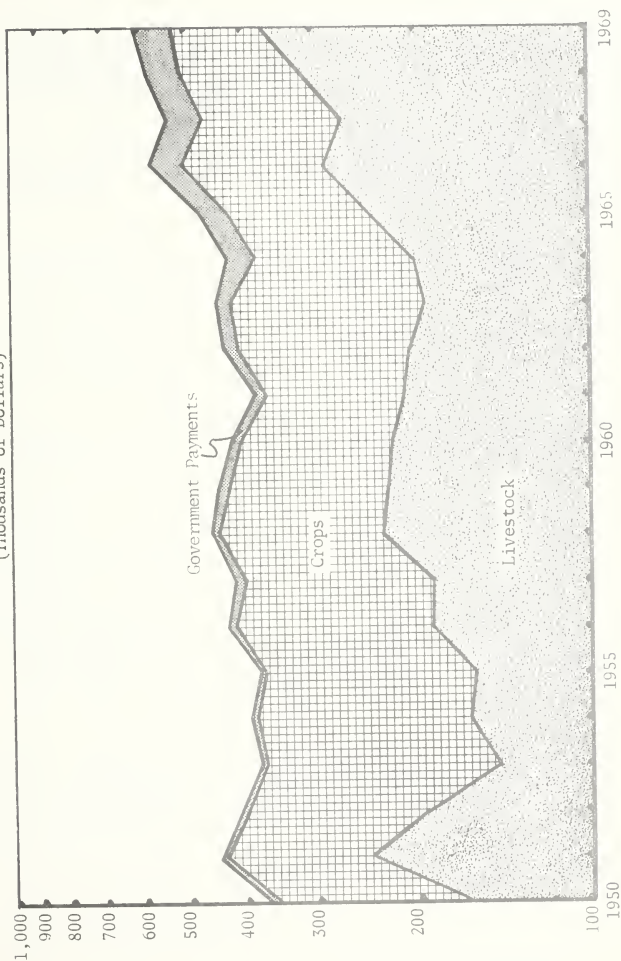
The decline in crop receipts has not been as drastic as figure 1.6 indicates. Beginning in 1964, a voluntary wheat-marketing certificate program was established by Congress. Under this program, which was continued through 1969, farmers who complied with acreage allotments and agreed to participate in a land-diversion program received price supports, marketing certificates, and land-diversion payments, while noncompliers received no payments.¹⁹ In the chart, money received from marketing certificates and land diversions is included in government payments rather than wheat receipts. The amounts received in 1966, 1967, 1968, and 1969 ranged from \$46 million to \$64 million, nearly all from marketing certificates (table 1.11); in other words, during those years approximately two-thirds of all government farm payments received in Montana went to wheat farmers under the wheat-marketing program. In 1968, Montana wheat producers farming approximately 96 percent of the acreage eligible for the wheat program participated in it.

Most of the wheat produced in Montana is shipped west, to the Pacific Coast states, either for milling or for export. Between July 1, 1966, and June 30, 1967, 86 percent of all rail shipments of wheat had destinations in states to the west of Montana; railroads hauled over three-fourths of all the wheat shipped that year.²⁰

19. Wayne D. Rasmussen and Gladys L. Baker, "A Short History of Price Support and Adjustment Legislation and Programs for Agriculture, 1933-65," Agricultural Economics Research, U.S. Department of Agriculture, Economic Research Service, vol. 18, no. 3 (July 1966), pp. 77-78.

20. Charles Rust and George St. George, Grain Shipments in Montana, Montana Agricultural Experiment Station, Bulletin 624 (Bozeman, Montana: Montana State University, 1969), p. 4.

FIGURE 1.6
Cash Receipts from Farm Marketings and
Government Payments, Montana, 1950-1969
(Thousands of Dollars)



Sources: [All data, 1950-1965; government payments, 1966-1967] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 12 (Helena, Montana, 1968), p. 11.

[Cash receipts from livestock and livestock products, crops, and farm marketings, 1966-1968; government payments, 1968] U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1968, Supplement to July, 1969, Farm Income Situation, FS 214 (August 1969), tables 11 and 14, pp. 115 and 135.

[All data, 1969] U.S. Department of Agriculture, Statistical Reporting Service, Montana Crop and Livestock Reporting Service, Farm Income - 1969 (Helena, Montana, April 9, 1970), p. 1.

TABLE 1.10
Cash Receipts by Farm Commodities, Montana, 1968

<u>Commodity</u>	<u>Receipts (\$000)</u>	<u>Percentage of Total</u>
All commodities	509,505	100.0
Livestock and livestock products	316,184	62.1
Meat animals	285,693	56.1
Cattle and calves	261,503	51.3
Sheep and lambs	12,869	2.5
Hogs	11,321	2.2
Dairy products	15,589	3.1
Chickens and eggs	6,159	1.2
Miscellaneous livestock	8,743	1.7
Crops	193,321	37.9
Food grains	133,668	26.2
Wheat	133,611	26.2 ^a
Rye	57	----
Feed crops	33,763	6.6
Barley	24,257	4.7
Hay	8,283	1.6
Other feed crops	1,223	0.2
Vegetables	4,741	0.9
Potatoes	3,090	0.6
Other vegetables	1,651	0.3
Fruits and nuts	712	0.2
All other crops	20,437	4.0
Sugar beets	15,878	3.1
Other crops	4,559	0.9

Source: U.S. Department of Agriculture, Economic Research Service, Farm Income: State Estimates, 1949-1968, Supplement to July 1969, Farm Income Situation, FS 214 (August 1969), table 11, p. 115.

^aLess than 0.1 percent.

TABLE 1.11

Government Payments to Farmers and Ranchers,
by Program, Montana, 1969

<u>Program</u>	<u>Amount</u> ^a
Conservation	\$ 3,838,000
Sugar Act	2,118,000
Milk Indemnity	6,000
Wool Act	3,309,000
Soil Bank	1,119,000
Great Plains Conservation	816,000
Feed Grain Program	4,712,000
Wheat Program	63,858,000
Cropland Adjustment	306,000
Total	\$80,082,000

Source: U.S. Department of Agriculture, Statistical Reporting Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, Farm Income - 1969 (Helena, Montana, April 9, 1970), p. 1.

^aPreliminary.

One of the interesting agricultural developments during the sixties was the growth of an export market for hard spring wheat from Montana and the Dakotas. The north Pacific ports of the United States are natural supply sources for Asian markets where wheat products are increasingly accepted. Helped by export subsidy payments in the form of marketing certificates, increased amounts of high-quality hard spring wheat from Montana and the Dakotas have been exported to the Far East.

Most of the wheat shipped to Pacific Coast ports goes by rail and is subject to an inverse rate structure which means that Montana farmers pay a higher freight rate than Dakota producers, and receive a lower price for their wheat.²¹ Not surprisingly, Montana wheat farmers tend to be unenthusiastic about this arrangement. The railroads say that in order to insure an adequate supply of export wheat it is necessary to provide lower rates from the Dakotas, so that producers there receive comparable prices for wheat whether it goes to Minneapolis or Portland. Other experts believe that if competitive modes of transportation for wheat existed in Montana, producers in the state would not be subjected to such a pricing policy.

It is true, however, that increased sales to Asian countries have greatly reduced the surplus of spring wheat. Since 1966, while total United States wheat exports have been declining, exports of hard spring wheat through Pacific ports have continued to climb (table 1.12).

The question of what to do about wheat subsidies and wheat production is one of the most difficult agricultural problems facing the

21. The local price for wheat in Montana and the Dakotas usually is established by subtracting the transportation and handling costs for a particular weight and grade from the Minneapolis or Portland market price.

TABLE 1.12

Exports of Hard Spring Wheat Through Pacific Coast Ports,
Marketing Years 1962-63 Through 1968-69

<u>Marketing Year</u> <u>(July through June)</u>	<u>Exports</u> <u>(000,000 Bushels)</u>
1962-1963	0.8
1963-1964	3.2
1964-1965	3.8
1965-1966	19.9
1966-1967	25.1
1967-1968	36.8
1968-1969	38.9

Sources: [1962-1963] U.S. Department of Agriculture, Economic Research Service, Wheat Situation, WS-189 (July 1964), table 3, p. 25.

[1963-1964] U.S. Department of Agriculture, Economic Research Service, Wheat Situation, WS-193 (July 1965), table 3, p. 21.

[1964-1965] U.S. Department of Agriculture, Economic Research Service, Wheat Situation, WS-197 (July 1966), table 5, p. 19.

[1965-1966] U.S. Department of Agriculture, Economic Research Service, Wheat Situation, WS-201 (July 1967), table 3, p. 21.

[1966-1967] U.S. Department of Agriculture, Economic Research Service, Wheat Situation, WS-205 (August 1968), table 4, p. 23.

[1967-1968, 1968-1969] U.S. Department of Agriculture, Economic Research Service, Wheat Situation, WS-209 (July 1969), table 4, p. 15.

United States. We produce far more wheat than we need, but at a cost too high to compete on the world market. In spite of an increasing population, no significant increase in United States demand for wheat is in prospect. The per capita consumption of wheat in the United States has been declining since World War II; it is expected to continue to do so.

Between 1955 and 1967, almost half the wheat produced in the United States was exported; most of the exports were subsidized under various federal programs. Although American wheat has helped to feed hungry people around the world, export programs have been determined largely with regard to their effect on domestic agriculture. Because of expanded export programs, stocks of wheat stored in the United States on July 1, 1967, were the lowest in many years. The 1966 Food for Peace Act contemplated a major role for subsidized food exports to underdeveloped countries, and in 1967 acreage allotments were expanded in anticipation of increased demand from those countries. This demand did not develop because major wheat-producing countries all over the world harvested excellent crops. Wheat stocks in the United States grew from 425 million bushels to almost 539 million between July 1, 1967 and July 1, 1968. Despite cuts in acreage allotments in 1968, 1969, and again in 1970, stocks have continued to grow as production per acre increased and exports continued to decline. The U.S. Department of Agriculture fears wheat stocks of approximately 900 million bushels by July 1, 1970, more than in any year since 1964.²² As a result of acreage cuts,

22. U.S. Department of Agriculture, Economic Research Service, Demand and Price Situation, DPS-122 (November 1969), table 3, p. 12.

Montana's allowable wheat acreage declined from over 4 million acres in 1968 to 3.1 million acres in 1970--a drop of about 23 percent.²³

Marion Clawson, director of Resources for the Future's program in land use and management, in his Policy Directions for U.S. Agriculture written in 1967, stated that in the absence of heavily subsidized exports, it would be impossible to maintain the existing volume of wheat production and 1967 prices; that even if the government were willing to put the surplus into storage, the amount in storage would mount to impossibly high levels.²⁴ His prediction appears to have been accurate. Since 1967, exports have declined, stocks have risen and wheat allotments have been cut and support prices lowered.

Prices may be lowered further; indeed, the question is whether supports will be retained at all. Proposals for eliminating support prices are made with increasing frequency, especially in conjunction with suggestions for guaranteed incomes. Under these proposals, those farm families who could not earn an adequate income in a free market would be treated just as any other low-income family.

There is little doubt that the United States currently is moving toward a new and market-oriented agricultural policy. Some experts regard such a move as imminent, perhaps within the next few years. Montanans should realize what such a change in policy implies for the state. Agricultural policies that rely on past history--that is,

23. U. S. Department of Agriculture, Agricultural Stabilization and Conservation Service, Montana 1968 Annual Report (Bozeman, Montana), p. 81.

24. Marion Clawson, Policy Directions for U.S. Agriculture, Resources for the Future, Inc. (Baltimore: Johns Hopkins Press, 1968), pp. 179-180.

price supports and production control--treat Montana relatively well; the proposed new market-oriented policies mean serious problems for Montana producers.

There is a real question as to whether Montana wheat producers can compete effectively in a competitive market. If, because of climatic conditions, geographic location, or whatever, they cannot compete, the implications are many and serious, among them: an acceleration of the farm population exodus, either out of state or into Montana cities; a decline in farm values--the current prices of even the most marginal wheatland in the state assume the continuation of support prices; and more deserted communities in rural areas.

This is not a pleasant outlook, but Montanans must recognize that agriculture does not have the political muscle it once had and that the lower wheat prices and reduced acreage allotments of recent years reflect an increasing reluctance on the part of the American public to continue subsidizing agricultural production at the high levels of the past. This reluctance will grow as the urgency of other national problems increases and social priorities change.

There were approximately 2.9 million beef cattle on Montana ranches as of January 1, 1969.²⁵ Beef production is particularly important as a source of income in Regions IV and V, where much of the land is suitable only for grazing, but cattle ranches are found throughout the state. They range from very small to very large; the variation in size is greater for livestock operations than for other agricultural activities.

25. U. S. Department of Agriculture, Statistical Reporting Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, Livestock and Poultry Inventory--January 1, 1969 (Helena, Montana, February 14, 1969), p. 2.

Most cattle ranches are commercial operations producing stockers and feeders; there is also, of course, a purebred cattle industry servicing commercial operators.

A variety of commercial operations exists: cow and calf ranches, which sell weaned calves, usually from 8 to 12 months of age; ranches which carry calves over and market steers and heifers from 1 to 2 years of age; and ranches which buy young animals and graze them for a season. Many ranches combine two or more of these operations. Some cattle are fattened in the state, mostly for use by local packers, and the number of cattle in feedlots is increasing. The majority of cattle still go out of state for finishing. In 1968, almost half the total shipments--739,000 head--went to 3 midwestern states--Iowa, Minnesota, and Nebraska.²⁶

The outlook for beef production in the United States is reasonably good. Beef is one of the food products for which demand promises to increase. As incomes grow, consumers tend to upgrade their diets and this generally means eating more meat, especially beef. Per capita consumption of beef and veal in the United States rose from 71 pounds in 1950 to an estimated 112 pounds in 1968.²⁷ By 1980, consumption is projected to reach approximately 130 pounds per capita.²⁸ And, of course, the population is growing.

26. U.S. Department of Agriculture, Statistical Reporting Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, Montana Cattle Movements--1968 (Helena, Montana, February 27, 1969), table 2, p. 2.

27. U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1969, 90th Edition (Washington, D.C.: U.S. Government Printing Office, 1969), table 116, p. 82. (U.S. Department of Agriculture, Economic Research Service)

28. Rex F. Daley, Director, Economic and Statistical Analysis Division, Economic Research Service, U.S. Department of Agriculture, "Exploring the Future of the Agribusiness Industry," a speech before the Tennessee Farmers Cooperative, 25th Annual Meeting, Nashville, Tennessee, December 5, 1969, p. 6.

The outlook for beef production in Montana is not as promising. Cattle production is expensive in Montana: it costs more to buy a home for a cow here than in the midwest, for example, and Montana cows produce lighter weight calves. Beef production probably will increase in Montana, especially in the western mountain valleys, and it will continue to be an important activity in many parts of eastern Montana, but it will prosper only under premium management. The profitability of individual cattle operations in the state will depend upon further consolidation of small units, upon the relationship of total American beef production to demand, upon greater productivity per cow, and, to some extent, upon the establishment of an integrated beef industry in the state. Increased cattle feeding and meat processing would provide welcome alternative markets for Montana cattlemen.

Considerable interest exists in expanding the cattle feeding industry in Montana. The number of cattle fattened in the state has more than quadrupled since 1950. On January 1 of that year, 25,000 head were estimated to be in feedlots; by January 1, 1960, the number had risen to 70,000, and on January 1, 1970, the estimate was 115,000 (table 1.13). This is still a very small proportion of the total number of cattle marketed each year. The 157,000 fat cattle marketed in Montana throughout 1968 may be compared to a net movement of 1.1 million head of stockers and feeders to out-of-state feedlots. The presence of large quantities of both cattle and feed grains plus the growing markets in the Pacific Coast states seem to offer a potential for increased feeding here. This is especially true east of the Divide where grain is cheaper and the climate generally is more favorable for feeding than in western Montana, but less favorable than in many of

TABLE 1.13

Cattle and Calves on Feed and Marketed, Montana
1950-1970

<u>Year</u>	<u>Number on Feed January 1</u>	<u>Number Marketed During Year</u>
1950	25,000	NA
1951	26,000	NA
1952	32,000	NA
1953	45,000	NA
1954	54,000	NA
1955	62,000	NA
1956	62,000	NA
1957	68,000	NA
1958	61,000	NA
1959	65,000	NA
1960	70,000	115,000
1961	77,000	113,000
1962	69,000	100,000
1963	71,000	98,000
1964	85,000	128,000
1965	92,000	142,000
1966	100,000	168,000
1967	98,000	164,000
1968	104,000	157,000
1969	120,000	177,000
1970	115,000	

Sources: [Cattle and calves on feed, 1950-1953] U.S. Department of Agriculture, Agricultural Marketing Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, More Cattle and Sheep on Feed in Montana (Helena, Montana, January 18, 1954), p. 2.

Sources (Continued)

[Cattle and calves on feed, 1954-1955] U.S. Department of Agriculture, Agricultural Marketing Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, More Cattle But Fewer Sheep on Feed in Montana (Helena, Montana, January 21, 1955), p. 1.

[Cattle and calves on feed, 1956] U.S. Department of Agriculture, Agricultural Marketing Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, More Cattle and Less Sheep on Feed in Montana (Helena, Montana, January 18, 1957), p. 1.

[Cattle and calves on feed, 1957-1958] U.S. Department of Agriculture, Agricultural Marketing Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, Less Cattle and More Sheep on Feed in Montana (Helena, Montana, January 17, 1958), p. 1.

[Cattle and calves on feed, 1959] U.S. Department of Agriculture, Agricultural Marketing Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, Cattle and Calves on Feed--January 1, 1960 (Helena, Montana, January 20, 1960), p. 1.

[All data, 1960-1967] Montana Department of Agriculture and U.S. Department of Agriculture, Statistical Reporting Service, Montana Agricultural Statistics, vol. 12 (Helena, Montana, 1968), p. 72.

[All data, 1968] U.S. Department of Agriculture, Statistical Reporting Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, Cattle and Calves on Feed--January 1, 1969 (Helena, Montana, January 20, 1969), pp. 1 and 2.

[All data, 1969-1970] U.S. Department of Agriculture, Statistical Reporting Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, Cattle and Calves on Feed--January 1, 1970 (Helena, Montana, January 20, 1970), pp. 1 and 2.

NA = data are not available.

the states to the south. Some producers believe that Montana is too cold and the feed conversion efficiency of cattle is too low for large-scale feeding.

Several changes would have to occur in the Montana cattle industry before a large expansion in feeding would be feasible. Feeder cattle would have to be available on a steady year-round basis; most Montana cattle now are marketed during a few months in the fall. Similarly, many present feeding operations are "one-shot" ventures--that is, they do not provide a regular supply of fat cattle to meat packers who must operate year-round. Some of the larger packers in the state have had to operate their own feedlots in order to insure a year-round supply of beef.

Most of the feedlots now operating in the state are too small to be efficient, and they do not make use of the latest technology. The Montana Crop and Livestock Reporting Service reported 470 feeding operations in the state in 1969. Only 55 of these had a capacity of over 1,000 head; and of the 55, only 10 could handle 4,000 head or more.²⁹

If Montana feeding is to be successful, the size of operation must be expanded, feedlots must operate on a year-round basis, and they must employ the latest automated equipment. One of the biggest obstacles may well prove to be financing: without considering the investment in facilities, one may calculate that 5,000 head of steers at \$250 each would require an investment of \$1.25 million. It is not easy to arrange capital or a loan of this size in Montana. And 5,000 head of steers

29. U.S. Department of Agriculture, Statistical Reporting Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, Cattle and Calves on Feed--January 1, 1970 (Helena, Montana, January 20, 1970), p. 2.

would stock only a small feedlot. Cooperative feedlots or feedlots operating on a fee basis might be promoted as a way of helping to overcome the financing problem. Large-scale, year-round feeding in the state might require intermediate feeders to hold cattle and "warm them up" for the feedlots. These changes are all quite possible and would come if a local market for feeders developed.

The location and layout of new feedlots will have to be carefully planned. Feedlots are a potential source of air and water pollution, and opposition from environment-conscious Montanans can be expected to develop quickly if locations are not carefully selected and adequate preventive measures are not provided.

Marketing also presents a problem. Fat cattle must either be sold to local processors, the most satisfactory solution, or shipped to packers near population centers. Further expansion of the meat packing industry in Montana seems problematical, at least for the next few years. (The section on food products manufacturing analyzes this possibility in greater detail.)

In spite of the obstacles, increased cattle feeding is a possibility for Montana. It is a desirable development in that it would provide additional markets for cattlemen and for grain producers and would create additional agricultural income. Increased feeding does not represent an important source of possible new employment. In a good-sized highly automated feedlot, the only kind that could successfully compete today, 6 or 8 workers can care for 10,000 or 15,000 head. If the fat cattle could be processed here in Montana, that, of course, would improve the employment outlook.

The fortunes of agriculture in Montana generally move with wheat and cattle. There are, however, a number of other product groups of importance to the state, among them sheep and lambs, dairy products, sugar beets, and feed grains.

To omit a discussion of sheep production from a section on Montana agriculture seems unthinkable. Yet in 1968, sheep and lambs provided only 2.5 percent of total cash farm receipts (table 1.10). They were important in earlier days; there were as many as 4 million sheep in Montana during the thirties. But their numbers have declined drastically in Montana--to 1.2 million in 1969--just as they have throughout the United States.³⁰

Lamb is the major product of sheep ranches, but lamb consumption, very small on a per capita basis, is declining. It was estimated at 4 pounds per person in 1950 and 3.7 in 1968.³¹ Wool (apparel wool) is produced largely as a by-product. About half the apparel wool in the United States is imported and subject to duties. Domestic wool producers receive payments under the Wool Act. In 1968, cash receipts from the sale of sheep, lambs, and wool in Montana amounted to \$12.9 million in 1969; payments under the Wool Act amounted to \$3.5 million (table 1.11). Should these payments be discontinued, sheep and lamb production would become even less significant as a source of employment and income.

Dairy products accounted for only 3 percent of total cash receipts of farmers in 1968 (table 1.10). The number of milk cows in the state

30. U.S. Department of Agriculture, Livestock and Poultry Inventory--January 1, 1969.

31. U.S. Department of Commerce, Statistical Abstract of the United States: 1969, table 116, p. 82. (U.S. Department of Agriculture, Economic Research Service)

has been declining since World War II, as it has nationwide. In 1950, there were an average of 114,000 head on Montana farms; in 1967, the figure was 49,000, or 57 percent fewer.³² Because of a remarkable increase in output per cow, the decline in total milk products was considerably smaller--37 percent over the same period. Based on national per capita consumption figures, Montana apparently has consumed more milk and milk products than it has produced in recent years. Montana does export cheese to the West Coast.

Some further decline in output of dairy products in the state seems likely. Per capita consumption of dairy products in the U.S.--and no doubt in Montana--is declining; competition from nondairy products such as margarine, coffeewhiteners, and imitation milk probably will become stronger.

Dairy farming is not an easy way of life; the confinement and the low returns on investment and labor have led many dairy men to seek other occupations. The decline seems sure to continue. Many Montana dairy farms still are too small for economic operation which means further consolidation probably will occur. Greater use of technology will result in declining labor requirements. With an industry serving primarily local markets, and with Montana's slow-growing population, fewer workers will be able to provide all the dairy products needed.

Sugar beets are produced on irrigated lands in Regions III, V, and VI. Well over half the production comes from Region V, especially

32. Montana Department of Agriculture and U.S. Department of Agriculture, Agricultural Marketing Service, Montana Agricultural Statistics, vol. 8 (Helena, Montana, 1960), p. 90; and Montana Department of Agriculture, Montana Agricultural Statistics, vol. 12, p. 67.

Big Horn, Carbon, and Yellowstone Counties.³³ The beets are processed at beet sugar factories at Billings, Hardin, and Sidney.

The domestic sugar industry is heavily protected; imports are restricted for the benefit of domestic producers who could not compete in the world market. They also receive government payments under the Sugar Act. The sugar program seems to be widely accepted and not likely to be changed.

Although two sugar factories, at Chinook and Missoula, have closed in recent years, and many producers have quit the business, sugar beet production has been increasing. The 1969 production of 1.2 million tons set a new record in the state, and may be compared to a national production of 28.5 million tons.³⁴ Further increases are expected; refining capacity is scheduled to increase from 8,400 tons of beets per 24 hours in 1969 to 11,500 tons per day in 1975--all through expansion of existing plants.³⁵ It also is possible to store sugar beets if plants wish to extend their run and increase their output. At the present time, the Montana plants generally operate only a few months in the fall. Increased cattle feeding in the Yellowstone Valley would provide more markets for beet pulp, a by-product of sugar production. Again, even with a growth in production, the outlook for increased employment in beet production

33. Montana Department of Agriculture, Montana Agricultural Statistics, vol. 12, p. 55.

34. U.S. Department of Agriculture, Statistical Reporting Service, Montana Crop and Livestock Reporting Service, and Montana Department of Agriculture, Agricultural Statistics, Montana Crop Production--1969 (Helena, Montana, December 24, 1969), p. 2.

35. Willard H. Godfrey, Jr. and Gail L. Cramer, Costs and Returns of Producing Sugar Beets and Other Irrigated Crops in Montana, Montana Agricultural Experiment Station, Bulletin 635 (Bozeman, Montana: Montana State University, 1969), p. 7.

is poor. But more sugar beets for processing could provide more employment in sugar plants. Both milk products, discussed above, and sugar beets take on more economic importance when one considers the employment created in processing plants. These activities are discussed in the chapter on manufacturing.

Feed grain production in Montana--mostly barley--has been quite erratic, because of variations in acreages and yield and changes in federal wheat programs. When wheat allotments are cut (as in recent years), barley acreage increases, since feed grain programs are not subject to acreage restrictions. In 1969, Montana farmers produced 68 million bushels of barley, or 12 percent of total United States output.³⁶ Future production of barley and other feed grains--and the mix among food and feed grains in Montana--will be tied closely to developments in federal programs.

Other commodities produced in Montana are listed in table 1.10. Although they are sometimes important locally, as, for example, cherry production on the east shore of Flathead Lake, they account for a very small portion of total state agricultural income and employment. The future of Montana agriculture lies with the products discussed in the preceding pages, particularly with beef cattle and wheat.

The Outlook

If there is a theme running throughout this section on agriculture, it is that farming and ranching in Montana, as in the United States, is changing rapidly and that it will continue to change. The impact of these changes on the state is evidenced in many ways. Continuing declines

36. U.S. Department of Agriculture and Montana Department of Agriculture, Montana Crop Production--1969, p. 2.

in the number of farms and ranches are reflected in the county population figures, which show rural counties still losing population, and in the many small towns, which once served as agricultural marketing centers and now find their reason for existence disappearing. For those Montanans convinced that rural living and the family farm offer a superior way of life, these losses are disheartening. Yet Montanans must recognize that if farm incomes are to be maintained, and if rural poverty is to be reduced, more people must leave farming and ranching, so that the process of consolidation can continue, and also so that marginal operators can find more remunerative ways to use their talents.

For in spite of the changes which have occurred in American agriculture, things remain very much the same. An article from the Federal Reserve Bank of Chicago described the situation very well:

At the beginning of the 1970s agriculture was still grappling with problems it had at the beginning of the 1960s. Farmers still have the capacity to produce substantially more than can be absorbed in domestic and world markets at "acceptable" price levels. The margin of excess capacity probably has increased instead of diminished. Agriculture still relies heavily on government subsidies to maintain income at an acceptable level, and the farm labor force is still substantially larger than required to supply the nation's needs for agricultural commodities.³⁷

This means that many of the influences that have affected agriculture in the sixties will continue. The readjustment, which began for Montana farmers and ranchers in the 1920s, is not yet over.

Further technological improvements no doubt will make increasingly larger agricultural units feasible. Output per worker will continue to

37. Federal Reserve Bank of Chicago, "Agriculture--Strong in 1969, excess capacity continued," Business Conditions (January 1970), p. 11.

increase, forcing additional declines in employment. New technology also is likely to increase total production, thereby bringing about further reductions in prices and further pressures on profits. Substantial changes in agricultural policy involving moves toward a freer market for farm products could have the most drastic effects of all, testing the ability of Montana grain farmers to compete in the national market.

Already, large capital requirements make farming a difficult occupation to enter; the amount of money needed for entrance is sure to increase and may encourage more corporate operations and out-of-state ownership in Montana.

As these and other changes take place, and as farming and ranching become more complex, success or failure will depend more and more upon good management. The Montana operator of the future will need to know as much about finance and marketing, for instance, as he does about raising cattle or harvesting wheat.

The Montana Economic Study estimates that by 1980, total employment in agriculture will have declined to 26,000, from 33,700 in 1968. This is a substantial decline, but it suggests a slightly smaller average annual loss than occurred between 1960 and 1968 and it is only half as large as the average annual decline during the 1950s. A more detailed discussion of agricultural employment projections appears in chapter 4, part 1 of the Research Report of the Montana Economic Study.

In this report, frequent reference has been made to national markets and national consumption, yet nearly everyone is aware of the tremendous growth in world population and of the predictions of world-wide shortages

of food. Doesn't this change the outlook for agriculture? Won't Montana agricultural production be needed to help feed the world? Most experts say no. They point out that most American agricultural products are not competitive on the world market, and they do not believe that the federal government will subsidize exports or give away large quantities of food in an attempt to help feed the world.³⁸ During the 1970s, they believe that United States agricultural growth will be determined largely by United States population growth. This means that Montana farmers and ranchers will have to compete with other agricultural regions in this country for the right to produce the food the United States needs.

38. For example, R. J. McConnen, Chairman, Department of Agricultural Economics and Economics, Montana State University, Bozeman, "Montana Agriculture--Potentials and Problems in the 1970s," speech before the Rural Areas Development Association, Billings, Montana, January 1970, p. 8; and Ahmad Al-Sammarie, Morris Cobern, and Takeshi Hori, National Economic Projections to 1978-79, National Planning Association, Center for Economic Projections, National Economic Projections Series, Report No. 68-N-1 (Washington, D.C.: National Planning Association, 1969), pp. 99 and 100.

CHAPTER 2

THE MINERAL INDUSTRIES

After the explorer, the trapper, and the trader, the prospector and the miner came to Montana. Abandoned camps and ghost towns mark the places where many early mining operations once flourished. Helena, an early gold camp, has survived as the state capital. Butte, the largest mining camp of all, is the site of a sophisticated mine operation which would surely astonish its founders.

The mineral industries--mining and the processing of mineral products--no longer play an overwhelmingly important role in Montana. Where they once represented approximately 27,000 jobs--in 1909, when 23,271 were engaged in mining and approximately 4,000 in smelting and refining--they now provide less than half that number (table 2.2).¹ Instead of 15 percent of the

1. U.S. Department of Commerce and Labor, Bureau of the Census, Thirteenth Census of the United States Taken in the Year 1910: Manufactures, 1909, Reports by States, with Statistics for Principal Cities, vol. 9 (Washington, D.C.: U.S. Government Printing Office, 1912), table I, p. 679; and U.S. Department of Commerce, Bureau of the Census, Thirteenth Census of the United States Taken in the Year 1910: Mines and Quarries, 1909, vol. 11 (Washington, D.C.: U.S. Government Printing Office, 1913), table 7, p. 111.

employed labor force, mineral industries employees now account for approximately 5 percent of all persons at work in the state.²

Yet mining cannot be discounted as an economic factor of importance in Montana, especially in certain areas. The mineral industries are one of Montana's basic, or primary, industries; that is, they produce for out-of-state markets. Much of the state's mineral production is exported. This means that employment in mining, smelting, and refining helps determine the growth in total employment; more jobs in mining mean more jobs in trade, services, finance, and other industries serving mostly in-state or local markets.³ A decline in mining jobs therefore may mean a decline in total employment in the community concerned. Thus Butte has been severely affected by the continuing decline in numbers of mine workers. In the recent past, shutdown of a smelter at Anaconda created great difficulties for that community. Many a small town in eastern Montana is dependent upon oil operations, and possible developments of as yet unexploited mineral resources could greatly change other Montana towns.

In describing Montana's mineral resources, the state can be divided into three parts. In Montana west of the Continental Divide, igneous, sedimentary, and metamorphic rocks are present and geologic structures are complex. The metalliferous ore deposits of the state--especially gold,

2. Computed from data obtained from U.S. Department of Commerce, Bureau of the Census, Thirteenth Census of the United States Taken in the Year 1910: Population, 1910, Occupation Statistics, vol. 4 (Washington, D.C.: U.S. Government Printing Office, 1914), table 3, p. 34; Employment Security Commission of Montana and U.S. Department of Labor, Bureau of Labor Statistics, Montana Civilian Work Force (Helena, Montana, December 19, 1969); and Employment Security Commission of Montana, unpublished data (Helena, Montana).

3. For a discussion of primary and derivative employment in Montana, see "The Montana Economy," Research Report of the Montana Economic Study, pt. 1, chap. 2 (Missoula, Montana: Bureau of Business and Economic Research, University of Montana, in progress), p. 2.15.

silver, copper, lead, zinc, and tungsten--are located in this area. Deposits of talc, corundum, iron ore, vermiculite, manganese, graphite, sillimanite, kyanite, and chromite also are present, as well as phosphate rock, limestone, silica, crushed and dimension stone, clays, and other industrial minerals.

In central Montana, igneous and metamorphic rocks are much less abundant and the chief resources of the area are petroleum, natural gas, coal, and some metals. The eastern third of the state contains more than 90 percent of Montana's extensive coal reserves. It also produces petroleum and bentonite.⁴

Montana's mines and oil wells produced minerals valued at over \$285 million in 1969, the highest ever recorded (table 2.1 and figure 2.1). This figure represents value at the mine or well; no recent estimates of value added by further processing in the state's smelters and refineries are available. Although a large number of minerals is produced in the state, two products--crude oil and copper--accounted for four-fifths of the total value of mineral production.

Metal mining (mostly copper production) and the primary metals industries (mostly smelting and refining of copper and aluminum) provide the largest share of the jobs in the mineral industries. The petroleum industry ranks second as an employer. Most of the remaining jobs in the mineral industries are provided by a group of small operations scattered around the state producing sand and gravel, phosphate rock, fluorspar, talc, and other

4. U.S. Congress, Senate Committee on Interior and Insular Affairs, Mineral and Water Resources of Montana, Report of the U.S. Geological Survey in collaboration with Montana Bureau of Mines and Geology, Committee Print, 88th Congress, 1st Session (Washington, D.C.: U.S. Government Printing Office, 1963), pp. 19-20.

TABLE 2.1
Mineral Production in Montana, 1969

Mineral	Quantity ^a	Value (\$000)
Clays ^b (thousand short tons)	27	28
Coal ^c (thousand short tons)	850	2,100
Copper ^d (short tons)	112,766	107,008
Gem stones	NA	109
Gold ^d (troy ounces)	23,388	987
Iron ore (thousand long tons, gross weight)	14	-----e
Lead ^d (short tons)	1,490	442
Lime (thousand short tons)	184	1,969
Manganese ore and concentrate ^f (short tons, gross weight)	1,996	48
Natural gas (million cubic feet)	23,840	2,408
Petroleum (crude) (thousand 42-gallon barrels)	44,260	119,059
Sand, gravel, and stone (thousand short tons)	20,000	21,300
Silver ^d (thousand troy ounces)	3,303	5,911
Zinc ^d (short tons)	4,897	1,430
Value of undisclosed items: bentonite, cement, fluorspar, gypsum, natural gas liquids, peat, phosphate rock, pumice, talc, tungsten, and vermiculite.	-----	22,854
Total		285,653

Source: U.S. Department of the Interior, Bureau of Mines, "The Mineral Industry of Montana in 1969," Mineral Industry Surveys, Preliminary Annual Report (Albany, Oregon, 1969), table 1.

Note: Preliminary estimates.

NA denotes that the data are not available.

^aProduction measured by mine shipments, sales, or marketable production (including consumption by producers).

^bExcludes bentonite.

^cBituminous and lignite.

^dRecoverable content of ores.

^eData withheld to avoid disclosure.

^fThirty-five percent or more manganese. No manganese was produced in 1969; data represent shipments from existing stockpile.



FIGURE 2.1
Total Value of Mineral Production in Montana, 1905-1969

Sources: [1905-1906] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1906 (Washington, D.C.: U.S. Government Printing Office, 1907), p. 55.

[1907-1908] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1909, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1911), p. 50.

[1909] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1910, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1911), p. 50.

[1910] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1911, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1912), p. 50.

[1911] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1912, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1913), p. 64.

[1912] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1913, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1914), p. LXX.

[1913] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1914, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1916), p. *53.

[1914] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1915, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1917), p. 79a.

[1915] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1916, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1919), p. 58a.

[1916] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1917, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1921), p. 61A.

[1917] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1918, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1922), p. 132A.

[1918] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1919, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1922), p. 138A.

[1919] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1920, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1922), p. 139a.

[1920] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1921, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1923), p. 116A.

[1921] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1922, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1924), p. 112A.

[1922] U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1923, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1927), p. 118A.

[1923] U.S. Department of Commerce, Bureau of Mines, Mineral Resources of the United States: 1924, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1927), p. 96A.

[1924] U.S. Department of Commerce, Bureau of Mines, Mineral Resources of the United States: 1925, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1928), p. A106.

[1925-1947] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1950 (Washington, D.C.: U.S. Government Printing Office, 1953), tables 5 and 6, pp. 42 and 57.

[1948] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1951 (Washington, D.C.: U.S. Government Printing Office, 1954), table 5, p. 58.

[1949] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1952, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1955), table 5, p. 23.

[1950] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1953, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1956), table 5, p. 23.

[1951] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1954, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1957), table 5, pp. 25-24.

[1952] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1955, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1958), table 5, p. 30.

[1953] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1956, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1958), table 5, p. 27.

[1954] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1957, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1959), table 5, p. 26.

[1955] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1958, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1959), table 5, p. 24.

[1956] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1959, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1960), table 5, p. 24.

[1957] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1960, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1961), table 5, p. 22.

[1958] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1961, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1962), table 5, p. 24.

[1959] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1962, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1963), table 5, p. 24.

[1960] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1963, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1964), table 5, p. 23.

[1961] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1964, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1965), table 5, p. 24.

[1962] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1965, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1967), table 5, pp. 19-20.

[1963] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1966, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1967), table 5, p. 19.

[1964-1967] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1967, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1968), table 5, p. 18.

[1968-1969] U.S. Department of the Interior, Bureau of Mines, Albany Office of Mineral Resources, "The Mineral Industry of Montana in 1969," Mineral Industry Surveys, Preliminary Annual Report (Albany, Oregon, December 17, 1969), table 1.

Note: Totals for years prior to 1942 are not strictly comparable with those for later years because of a change in the basis for determining clay production which became effective in 1942.

nonmetallic minerals, and by the plants which process their products. Coal production, once important in eastern Montana (4,800 employees in 1909), required only 75 workers in 1968;⁵ there are predictions, of course, that the state's huge coal resources may be utilized in future years.

Table 2.2 gives some idea of the extent of the employment and income provided by the various activities based on Montana minerals. Two manufacturing industries not commonly grouped with mineral industries--chemical products and stone, clay, glass, and concrete products--are included here because they process or utilize Montana mineral resources.

Like many other resource industries, mining has been a slow growth activity, and it is expected to remain so throughout the country. Furthermore, rapid technological changes in the industry have sharply reduced labor requirements per unit of output, and have left thousands of people out of work and thus adversely affected mining communities throughout the nation.

In Montana, mineral industries employment began to decline in 1956; between 1956 and 1969, 6,400 jobs disappeared (table 2.3). Because they were jobs which paid wages well above the Montana average, this was a serious loss for the state. Most of the decline occurred in the metals industry. One of Montana's major export industries, it is dependent on national and world demand for its products. Competition from producers in other parts of the country and the world and from other materials has forced extensive changes in Montana's metals operations. The shift from underground to open-pit mining, in particular, has greatly reduced labor

5. Table 2.2; and U.S. Department of Commerce, Thirteenth Census of the United States Taken in the Year 1910: Mines and Quarries, 1909, vol. 11, table 7, p. 111.

TABLE 2.2

Employment and Earnings in Montana's Mineral Industries, 1968

Industry	Average Monthly Employment ^a	Total Earnings
All mineral industries	11,779	\$89,147,626
Metal mining ^b	2,406	19,752,026
Copper ores	2,119	17,908,367
Lead and zinc ores	69	440,603
Gold and silver ores	103	589,041
Ferroalloy ores, except vanadium	38	301,051
Metal mining services	71	486,748
All other metal mining	6	30,016
Primary metal industries ^b	3,713	26,495,208
Primary smelting and refining of nonferrous metals ^c	3,515	25,075,327
Rolling, drawing, and extruding of nonferrous metals ^d	137	1,010,795
All other primary metal products	61	409,086
Bituminous coal and lignite mining	75	441,937
Crude petroleum and natural gas	2,116	15,881,143
Crude petroleum and natural gas	620	4,56,650
Natural gas liquids	12	97,323
Oil and gas field services	1,484	11,027,170
Petroleum refining and related industries	1,176	10,442,949
Mining and quarrying of nonmetallic minerals, except fuels	947	6,901,337
Crushed and broken stone	36	265,142
Sand and gravel	127	819,865
Clay, ceramic, and refractory minerals	34	297,280
Chemical and fertilizer mineral mining ^e	478	3,501,185
Miscellaneous nonmetallic minerals and services ^f	272	2,013,865
Chemicals and allied products	363	2,647,866
Industrial inorganic and organic chemicals ^g	278	2,150,468
All other chemicals	85	497,398
Stone, clay, glass, and concrete products	983	6,485,160
Cement, hydraulic	221	1,687,148
Concrete, gypsum, and plaster products ^h	666	4,304,710
All other stone, clay, glass and concrete products	96	493,302

Source: Employment Security Commission of Montana, unpublished data (Helena, Montana).

^aWage and salary workers only.

^bAnaconda Company workers were on strike during the first three months of 1968. In 1969, average monthly employment in metal mining was 3,300 and in primary metals, 4,700. No further breakdown was available at the time this report was prepared.

^cIncludes copper, lead, zinc, aluminum, silver, and gold.

^dIncludes copper and aluminum wire, rod, and cable.

^eIncludes fluorspar and phosphate rock.

^fIncludes gypsum, talc, and vermiculite.

^gIncludes elemental phosphorus and sulphur.

^hIncludes concrete block and brick, other concrete products, ready-mixed concrete, and lime.

TABLE 2.3
Employment in Metal Mining, Smelting and Refining, Coal, Petroleum and Gas,
and Other Nonmetallic Minerals, Montana, 1950-1969

Year	Number	Combined Employment Percentage of Total Nonagricultural Employment	Metal Mining, Smelting and Refining			The Petroleum and Gas Industries			Other Nonmetallic Mining
			Total	Metal Mining	Smelting and Refining	Coal	Total	Petroleum and Gas Natural Gas	Oil Refining
1950	15,200	10.2	11,800	7,800	4,000	800	2,200	1,200	1,000
1951	15,100	10.0	11,500	7,900	3,600	700	2,400	1,400	1,000
1952	16,100	10.4	11,800	8,200	3,600	500	3,200	2,100	1,100
1953	16,500	10.5	11,800	8,200	3,600	500	3,600	2,400	1,200
1954	15,200	9.7	10,700	7,400	3,300	400	3,600	2,400	1,200
1955	15,200	10.8	12,700	8,400	4,300	400	3,900	2,700	1,200
1956	18,200	10.8	13,300	8,700	4,600	300	4,000	2,800	1,200
1957	16,800	10.2	12,300	7,500	4,800	200	3,700	2,500	1,200
1958	13,900	8.6	9,600	5,400	4,200	200	3,500	2,500	1,000
1959	11,800	7.1	7,700	4,600	3,100	200	3,400	2,500	900
1960	12,100	7.3	8,300	4,500	3,800	100	3,100	2,200	900
1961	11,700	7.0	7,800	4,200	3,600	100	3,200	2,200	1,000
1962	11,300	6.6	7,300	3,800	3,500	100	3,300	2,200	1,000
1963	11,500	6.6	7,300	4,100	3,200	100	3,300	2,100	1,200
1964	12,500	6.7	8,100	4,800	3,300	100	3,100	1,900	1,200
1965	12,500	6.7	8,100	4,800	3,300	200	2,900	1,800	1,100
1966	12,500	6.7	8,700	5,000	3,700	100	2,800	1,700	1,000
1967	10,100	5.3	6,400	3,200	3,200	100	2,700	1,600	900
1968	10,200	5.2	6,000	2,300	3,700	100	2,700	1,600	900
1969 ^b	11,800	6.0	8,000	3,300	4,700	100	3,000	2,000	1,000

Source: Employment Security Commission of Montana and U.S. Department of Labor, Bureau of Labor Statistics, "Employees on Montana Nonagricultural Payrolls," Montana Labor Market: Employment Series by Months, Supplement 1 (Helena, Montana), and unpublished data.

Note: Includes wage and salary workers only. Figures for 1954, 1959-1960, 1962, and 1967-1968 reflect strikes in the metal mining and smelting and refining industries.

^aData for years prior to 1958 are not strictly comparable with data for later years because of changes in the 1957 Standard Industrial Classification.
^bPreliminary.

requirements and helped keep Montana copper competitive, but at the same time has decreased employment depressingly.

On the other hand, employment in stone, clay, and glass products increased between 1950 and 1969, mostly as the result of the growing utilization of Montana's mineral resources (see Chapter 3 on manufacturing, table 3.6).

It should also be noted that, in the past, most minerals produced in Montana have at one time or another been subsidized in various ways by the federal government. Forms of assistance have included import quotas, government purchases and stockpiling programs, and financial assistance in exploration. As federal programs have been discontinued, the production of several metals in Montana also has ceased or declined substantially--among them tungsten, manganese, chromite, and zinc.

The following section will discuss metal mining and the primary metals industries in Montana. Other sections in this chapter will be concerned with coal; with crude petroleum and natural gas production and petroleum refining; and with other nonmetallic minerals.

Metal Mining and the Primary Metals Industries

When one refers to mining in Montana, the reference usually is to metal mining, and more particularly to the operations in and around Butte--site of the wars of the copper kings, the bitter labor-management disputes, and the Montana headquarters of The Anaconda Company, which has played a leading role in the development of the state from territorial days. Most of the metal mining does take place in Silver Bow County, but smelting

and refining activities are more scattered: Anaconda, Butte, Columbia Falls, Great Falls, and East Helena all are locations for primary metals plants. And, although the value of metals produced in Montana is exceeded nowadays by the value of crude oil output, metal mining and primary metals still are the largest employers among the mineral industries. Their political influence is considerable--partly as a legacy from the past, and partly because of their concern today with tax and conservation laws that affect them. Their economic influence is more limited and is strongest in the Butte-Anaconda area. Even there, their presence has been characterized by great instability, sometimes as a result of market conditions--the Butte mines have always been highly susceptible to price changes--and sometimes the result of labor-management disputes. Strikes have always been--and apparently still are--a tradition in Butte and Anaconda.

A Brief History

The history of metal mining in western Montana began in the 1850s with the first discovery of gold at Gold Creek, which flows into the Clark Fork River a few miles west of Garrison.⁶ Later discoveries proved more extensive: at Grasshopper Creek (Bannack) in 1862, Alder Gulch (Virginia City, Nevada City, Circle City, and Central City) in 1863, and Last Chance Gulch (Helena) in 1864. Thousands of miners, gamblers, saloon keepers, and hangers-on, plus a good number of outlaws, rushed to these camps and to many other, mostly short-lived, communities which were established during the 1870s. Other economic activities sprang up

6. Much of the historical data which follows is based on Merrill G. Burlingame and K. Ross Toole, A History of Montana, vol. 1 (New York: Lewis Historical Publishing Company, Inc., 1957), chap. 14, pp. 341-372.

to supply the growing population; farming, stock raising, and lumbering owe their beginnings to the presence of the early day miners.

The first discovery at Butte--gold--occurred in 1864. Several communities soon were established in the area: Butte, Silver Bow, and Rucker. By the early 1870s, however, all three towns were on the verge of extinction. Placer claims were almost worked out, and interest had turned to silver. Some of the silver ores also contained copper. Both silver and copper were difficult to refine, and copper was not well known to miners at that time.

By 1876, the silver refining problem had been solved and William A. Clark was operating a successful silver stamp mill in Butte. During the following years, several more mills were completed. By the end of the seventies, Butte had become an important silver-producing area; so had Philipsburg, some 50 miles to the northwest.

In the 1880s, copper began to take over. Rich copper ores were discovered; the Utah Northern Railroad reached Silver Bow outside Butte, providing a way to reach distant markets; and a strong demand for copper sprang up after the invention of the telephone and the incandescent lamp. Prices were high enough to permit production in Butte which, from the beginning, was a high-cost production area. Several successful small smelters were built in the early part of the decade and, in 1884, Marcus Daly constructed a smelter at Anaconda. (The present smelter was completed later, in 1902.) It is interesting now to recall that even those early smelters created a smoke and air pollution problem which resulted in public protests and litigation during the next 20 years.

The development of the Butte copper mines and the intense rivalry and the political war which developed between Marcus Daly and W. A. Clark

have been well documented. The significant thing to remember, however, about the "War of the Copper Kings" is that Butte was the site of a new kind of mining operation. It would be the first in the country to be integrated all the way through the production of electrolytically-refined copper. Instead of a miner with a pick and a single jack, large-scale quartz mining required corporate organization and huge amounts of capital, not available in Montana. It led to demands for labor, transportation, financial services, power, mine timbers, building materials, and all of the goods and services necessary to support a sizable population. Copper mining provided a longevity not then present in Montana mining camps; it provided a basis for real and permanent growth. And, the skirmishes between Clark and Daly played a large part in the state's political history, as well as its economic development.

The census taken in 1890 reported that total state employment in mining and in smelting and refining in 1889 exceeded 8,400 persons. Seventy percent--approximately 5,900--were reported at work in gold and silver operations; approximately 2,000 were engaged in copper production.⁷ Twenty years later, in 1909, employment in the metal mining and smelting industries had grown to approximately 20,000-21,000.⁸ Metal mining employment was reported at 16,587 by the Census Bureau in 1909;⁹ the number of workers in smelters was not given because of disclosure rules,

7. U.S. Department of the Interior, Census Office, Report on Mineral Industries in the United States at the Eleventh Census: 1890 (Washington, D.C.: U.S. Government Printing Office, 1892), pp. 59 and 155.

8. Another 4,800 workers were employed in coal mines that year.

9. U.S. Department of Commerce, Thirteenth Census of the United States Taken in the Year 1910: Mines and Quarries, vol. 11, table 7, p. 111.

but it seems to have been about 4,000.¹⁰ Among the miners 85 percent (14,251) now were producing copper; the number at work in gold and silver mines had dwindled to 2,336.¹¹

Most of the copper production, of course, came from Butte, which by 1910 had a population of 39,165, making it the largest city in Montana.¹² Smelters operated there and in Anaconda and Great Falls. The 1910 Census noted that a heavy degree of centralization existed in the copper industry, where 71 percent of the wage earners employed worked for 5 Butte corporations.¹³ In 1910, the leading copper-producing firms were consolidated into the Anaconda Copper Mining Company. From that time on, the history of metals production in the state was synonymous with the history of The Anaconda Company. And, for the most part, metals meant copper.

The years from 1900 to 1919 represented the height of Montana's metals mining industry from the standpoint of employment and output. In 1916, an all-time copper production record of 176,000 tons was achieved.¹⁴ The

10. Five thousand one hundred workers were reported in the "all other industries" group in 1909; this group included smelting and refining and a number of small miscellaneous manufacturing establishments. U.S. Department of Commerce and Labor, Thirteenth Census of the United States Taken in the Year 1910: Manufactures, vol. 9, table 1, p. 679.

11. U.S. Department of Commerce, Thirteenth Census of the United States Taken in the Year 1910: Mines and Quarries, vol. 11, table 7, p. 111.

12. U.S. Department of Commerce, Bureau of the Census, Fourteenth Census of the United States Taken in the Year 1920: Population, 1920, Number and Distribution of Inhabitants, vol. 1 (Washington, D.C.: U.S. Government Printing Office, 1921), table 48, p. 84.

13. U.S. Department of Commerce, Thirteenth Census of the United States Taken in the Year 1910: Mines and Quarries, vol. 11, table 3, p. 109.

14. Prior to 1939, employment figures are available only for census years. U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1917, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1921), p. 61A.

price of copper, which had ranged between 11 and 20 cents per pound since 1897, averaged over 27 cents per pound during 1916 and 1917; it would not reach that level again until 1953.¹⁵

It should also be noted that the greatest labor unrest and turbulence in Butte occurred during the years 1900 to 1919. The details are confused, but there appear to have been two struggles going on simultaneously: one between the company and the union, and the other between conservative and radical union members.

In 1915, another metal--zinc--was added to the list of major Montana products. Originally, the presence of zinc in copper and silver ores proved troublesome; no one knew how to process it. In 1915, The Anaconda Company perfected a method of refining zinc, and from that year on Montana was an important zinc producer. The highest output ever achieved, however, occurred in 1916; other periods of high production occurred in the 1920s and the early 1950s. Montana zinc deposits can be mined profitably only when prices are high; at other times zinc output has been largely a by-product of copper mining operations.

Lead also is present in Montana ores; in fact, zinc, lead, and silver frequently are mined from the same deposits. Some lead had been produced since the 1880s, but no production of any size was achieved until after 1915, when lead-zinc ores began to be exploited. Lead has never been a major Montana metal in terms of production. Silver output reached its peak in 1918; since then, production has been chiefly a by-product of the

15. "E & M J Annual Average Metal Prices--1897 to 1958," Engineering and Mining Journal, vol. 160, no. 2 (February 1959), p. 87; and "Annual Average Metal Prices--1900 to 1968," Engineering and Mining Journal, vol. 170, no. 3 (March 1969), p. 78.

Butte copper and zinc mines. And by World War I, the story of gold mining in Montana had become largely a recital of past, pre-1900 glories.

The first reported production of manganese ore in Montana came in 1916; the largest output on record occurred in 1918, when the state's mines produced 200,000 tons, mostly at Butte and Philipsburg.¹⁶ Since the United States has always imported most of its manganese requirements, manganese production has not been an important activity in Montana, although the mine at Philipsburg was for many years a significant source of employment for that small town. Production stopped in 1967.

Throughout the period from 1910 to 1930, the number of metal mines operating in the state declined. Except for the Great Depression, this trend might have continued uninterrupted. Instead, between 1931 and 1943, the number of operations--especially gold mines--turned upward as the price of gold rose and as jobless miners tried to scratch out a living by prospecting and mining on their own. Since 1943, the downward trend in number of mines has resumed.¹⁷

In 1939, after a decade of depression, Montana's metal industry employed 10,700 wage and salary workers.¹⁸ (This figure does not include

16. U.S. Department of the Interior, U.S. Geological Survey, Mineral Resources of the United States: 1919, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1922), p. 138A.

17. U.S. Congress, Mineral and Water Resources of Montana, p. 10.

18. Harold J. Hoflich and Maxine Johnson, The Economy of Montana, pt. 1 of Unemployment Insurance in Montana (Missoula, Montana: Bureau of Business and Economic Research, Montana State University [now University of Montana], 1951), table 23, p. 54. (Unemployment Compensation Commission of Montana [now Employment Security Commission of Montana])

self-employed persons.) The number had sunk much lower during the early thirties. No annual data are available to document the drop in employment, but copper production, which accounted for approximately 57 percent of the total value of minerals produced in 1929, fell 79 percent between 1929 and 1934.¹⁹ After a quick, temporary recovery, output plummeted 46 percent between 1937 and 1938, giving credence to one writer's statement (in 1943) that ". . . Butte is forever down or up, never level."²⁰

World War II, of course, brought a heavy demand for Montana's metal products. Production of copper in particular was expanded as rapidly as possible. (Prices during the war were substantially above the official base price shown in figure 2.2; producers were paid premiums for output above their quotas for each period.) Chromium, manganese, and tungsten mines, whose operation was uneconomic in peacetime, were put into production with federal government assistance. Despite labor shortages, employment in metal mining and primary metals exceeded 17,000 in 1942, again mostly in the Butte area.²¹ The metals industry would never again approach that figure. Toward the end of the war, employment and production declined until price controls were removed and prices began to go up in 1946.

Zinc production in Montana had a renaissance after 1946, during a period of unusually high prices; in 1951, when prices began to fall

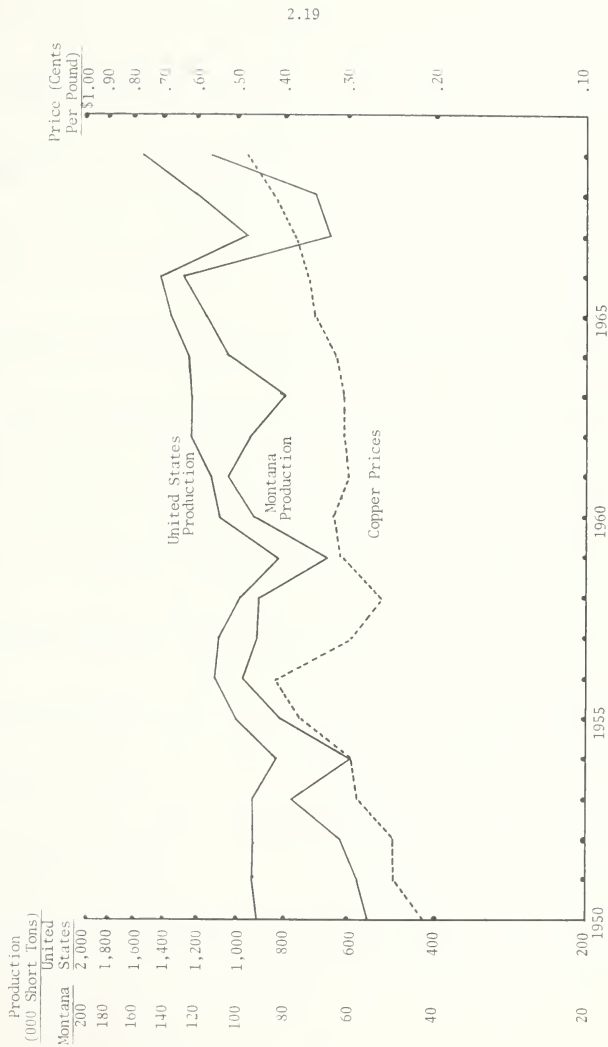
19. U.S. Department of Commerce, Bureau of Mines, Mineral Resources of the United States: 1930, Metals, pt. 1 (Washington, D.C.: U.S. Government Printing Office, 1933), p. A106; and U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1937 (Washington, D.C.: U.S. Government Printing Office, 1937), p. 81.

20. U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1940 (Washington, D.C.: U.S. Government Printing Office, 1940), p. 30; U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: Review of 1940 (Washington, D.C.: U.S. Government Printing Office, 1941), p. 38; and Joseph Kinsey Howard, Montana: High, Wide, and Handsome (New Haven: Yale University Press, 1943), p. 93.

21. Hoflich and Johnson, The Economy of Montana, table 23, p. 54.

FIGURE 2.2

Mine Production of Copper, Montana and the United States, and Copper Prices, 1950-1960



Sources: [Montana, 1950] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1953, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1956), table 5, p. 23.

[Montana, 1951] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1954, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1957), table 5, p. 23.

[Montana, 1952] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1955, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1958), table 5, p. 30.

[Montana, 1953] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1956, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1958), table 5, p. 27.

[Montana, 1954] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1957, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1959), table 5, p. 26.

[Montana, 1955] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1958, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1959), table 5, p. 24.

[Montana, 1956] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1959, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1960), table 5, p. 24.

[Montana, 1957] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1960, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1961), table 5, p. 22.

[Montana, 1958] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1961, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1962), table 5, p. 24.

[Montana, 1959] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1962, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1963), table 5, p. 24.

[Montana, 1960] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1963, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1964), table 5, p. 23.

[Montana, 1961] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1964, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1965), table 5, p. 24.

[Montana, 1962] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1965, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1967), table 5, p. 19.

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[Montana, 1963] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1966, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1967), table 5, p. 19.

[Montana, 1964-1967] U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1967, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1968), table 5, p. 18.

[Montana, 1968-1969] U.S. Department of the Interior, Bureau of Mines, Albany Office of Mineral Resources, "The Mineral Industry of Montana in 1969," Mineral Industry Surveys, Preliminary Annual Report (Albany, Oregon, December 17, 1969), table 1.

[United States, 1939, 1941-1949, 1951-1954] U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1957, Statistical Abstract Supplement (Washington, D.C.: U.S. Government Printing Office, 1960), Series M 225, p. 368.

[United States, 1956-1959, 1961, 1962] U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1957, Continuation to 1962 and Revisions, Statistical Abstract Supplement (Washington, D.C.: U.S. Government Printing Office, 1965), table 1, p. 54.

[United States, 1963] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1966, 87th edition (Washington, D.C.: U.S. Government Printing Office, 1966), table 1084, p. 728. (U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook)

[United States, 1964] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1967, 88th edition (Washington, D.C.: U.S. Government Printing Office, 1967), table 1059, p. 705. (U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook)

[United States, 1966] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1968, 89th edition (Washington, D.C.: U.S. Government Printing Office, 1968), table 1053, p. 686. (U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook)

[United States, 1940, 1950, 1955, 1960, 1965, 1967] U.S. Department of Commerce, Bureau of the Census, Statistical Abstract of the United States: 1969, 90th edition (Washington, D.C.: U.S. Government Printing Office, 1969), table 1052, p. 681. (U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook)

[United States and price, 1968-1969] U.S. Department of Commerce, Office of Business Economics, Survey of Current Business, vol. 50, no. 4 (April 1970), p. S-33.

[Price, 1950-1967] "Annual Average Metal Prices--1900 to 1968," Engineering and Mining Journal, vol. 170, no. 3 (March 1969), p. 78.

Note: Strikes occurred in 1954, 1959, 1960, 1962, 1967, and 1968.

again, it began a slow decline. For six years, however, in 1948 and from 1950 to 1954, more zinc than copper was produced in Montana.

Montana's copper output did not respond to rising postwar prices until 1952, when block-caving methods were initiated in the Kelley mine. From then until 1956, except for a strike-induced decline in 1954, output increased as demand continued strong and the prices kept rising. In early 1956, the price of copper reached 46 cents per pound.²² This peak price was not maintained for long; in the face of consumer resistance and loss of markets to other materials, it had fallen to 33 cents by February 1957 and production cutbacks were in effect both in the United States (including Montana) and abroad.²³

The Industries Today

The year 1956 marked a turning point in the mining and smelting industries in Montana. It was the year of the first substantial copper production from the Berkeley pit--The Anaconda Company's answer to high production costs in Butte. This open-pit operation was designed to utilize low-grade ores and to keep costs competitive with those of other producing areas. The initial investment amounted to approximately \$16 million for mine equipment, smelter changes, and new railway rolling stock.²⁴ It represented a substitution of capital for labor, and its

22. "E & M J Weekly Average Metal Prices--1956," Engineering and Mining Journal, vol. 158, no. 2 (February 1957).

23. "E & M J Weekly Average Metal Prices--1957," Engineering and Mining Journal, vol. 159, no. 2 (February 1958), p. 108.

24. U.S. Department of the Interior, Bureau of Mines, "The Mineral Industry of Montana in 1955," Mineral Industry Surveys, Area Report B-45 (Albany, Oregon, 1956), p. 7.

effect immediately became clear (figure 2.3). In general, except for a slight decline between 1956 and 1958, and allowing for several "abnormal" years characterized by strikes (1959-60, 1962, and 1968-69) or the change-over to a new concentrator (1963), the trend in Montana copper production since 1956 has been up. Employment, for the most part, has declined since the conversion to open-pit operations.

Figure 2.4 illustrates the increased output of copper per man-hour and the resulting decline in wages paid per ton produced. Despite steadily increasing hourly earnings by production workers, total wages paid per ton of copper produced were 25 percent lower in 1966 than in 1956, the year production from the pit began. The figures, of course, do not reflect total labor costs; information concerning increased fringe benefit costs is not available. Obviously, other costs also have risen since 1956. And, year-to-year changes in output per man-hour and in wages paid per ton produced also depend upon the mix between open-pit and underground production. Nevertheless, it is obvious that the ability of Montana copper to compete in world markets has been greatly enhanced, even at a cost of several thousand jobs in metal mining.

Late in 1963, a new copper concentrator at Butte, adjacent to the Berkeley pit, further reduced the need for workers in connection with copper production; in 1964, copper concentrating at Anaconda was discontinued. Table 2.4 indicates that the investment in new and modern plants has placed the state's metals industry in a favorable position vis-a-vis the rest of the country. Among Montana's major manufacturing industries only smelting and refining appears to have a distinct advantage with respect to labor costs and value added. Between 1963 and 1966, value added

FIGURE 2.3
Copper Production and Metal Mining Employment
Montana, 1950-1969



Sources: [Copper production, 1950-1969] See figure 2.2,

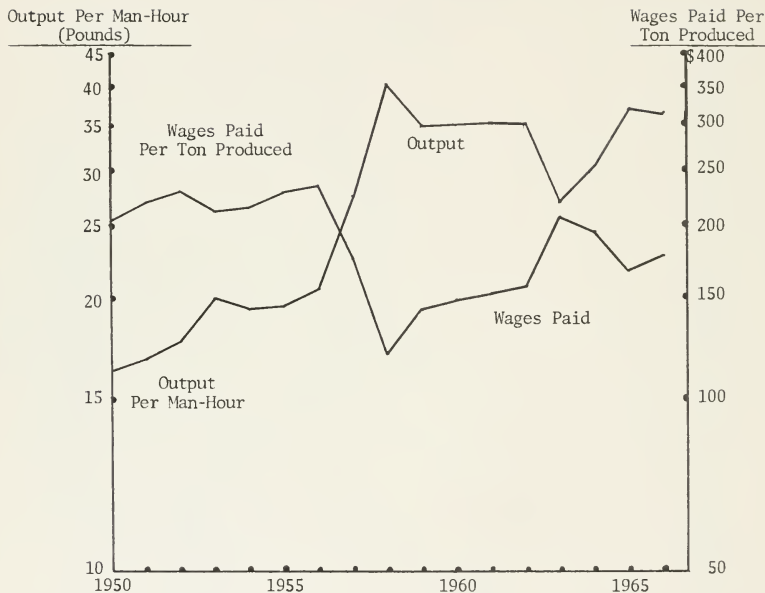
[Metal mining employment] Employment Security Commission of Montana,
"Employees on Montana Nonagricultural Payrolls," 1950-1969, Montana Labor
Market: Employment Series by Months, Supplement 1 (Helena, Montana).

Notes: Wage and salary workers only.

Strikes occurred in 1954, 1959, 1960, 1962, 1967, and 1968.

FIGURE 2.4

Changes in Output and Production Costs
Montana's Copper Industry, 1950-1966



Source: Computed by Bureau of Business and Economic Research (Missoula, Montana) using data from the U.S. Department of the Interior, Bureau of Mines, and the Employment Security Commission of Montana.

Note: Strikes occurred in 1954, 1959, 1960, and 1962.

TABLE 2.4

Value Added in Smelting and Refining of Nonferrous Metals: Some Comparisons
Montana and the United States, 1963-1966

Year	Value Added Per Production Worker		Value Added Per Dollar of Wages		Wages Per Production Worker (Man-hour)	
	United States	Montana	United States	Montana as Percentage of United States	United States	Montana as Percentage of United States

1963	\$16,423	\$18,084	\$2.72	\$3.36	\$2.92	\$2.88
1964	17,275	20,250	2.75	3.54	3.00	3.02
1965	18,724	24,699	2.86	4.09	3.09	3.07
1966	21,240	24,946	3.12	3.92	3.20	3.21

Sources: [1963] Computed from data obtained from U.S. Department of Commerce, Bureau of the Census, *U.S. Census of Manufactures: 1963, Area Statistics*, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1966), tables 5 and 5, pp. 58, 59, and 2-7-7.

[1964] Computed from data obtained from U.S. Department of Commerce, Bureau of the Census, *Annual Survey of Manufactures: 1964-1965* (Washington, D.C.: U.S. Government Printing Office, 1968), tables 1 and 3, pp. 43 and 381.

[1965-1966] Computed from data obtained from U.S. Department of Commerce, Bureau of the Census, *Annual Survey of Manufactures: 1966* (Washington, D.C.: U.S. Government Printing Office, 1969), tables 1 and 3, pp. 40-42, 373, and 381.

Notes: Figures on blast furnaces, steel works, rolling and finishing mills, and iron and steel foundries have been excluded from United States data in order to make comparison with Montana figures more meaningful.

In 1963, The Anaconda Company was in the process of a changeover to its new Butte concentrator.

per production worker on an annual basis and value added per dollar of wages in Montana substantially exceeded the United States figures. Average hourly wage rates were essentially the same in both areas. In order to make the industry comparison between the state and the nation legitimate, data for the iron and steel industry were excluded from the national figures. Montana, of course, does not produce iron and steel.

During the mid-sixties, 1964-1966, the growing civilian demand and United States involvement in the Vietnam War were reflected in increased copper production in Montana. Some expansion in number of workers occurred, but metal mining employment never regained the 1958 level (figure 2.3). By early 1967, the copper shortage which had developed had begun to ease as consumption by the automotive, housing, and appliance industries declined. Soon we had too much copper: high inventories were the rule in August 1967, when the longest work stoppage in the history of copper mining (eight and one-half months) began.

In 1969, production began to increase again; the total exceeded 1964's high and was only slightly less than in 1965. Employment, however, remained well below 1964-1966 numbers (figure 2.3). Indeed, a look at employment patterns since 1956 indicates that the attrition which occurs when a strike takes place may well have assisted in the reduction of employment which new mining methods were designed to accomplish.

In August 1969, the long-closed copper concentrator in Anaconda was reopened to handle the increased copper production at Butte, some of which was again coming from underground mines. High copper prices and difficulties in The Anaconda Company's Chilean operations probably caused the reopening. The Anaconda concentrator is old and undoubtedly less

efficient than other company facilities, including, of course, the Butte plant. The reopening was fortunate for the community of Anaconda, and partly offset the effects of the closure of the Company's zinc plant there the month before. It is not unreasonable to speculate, however, that a decline in the demand for copper might soon be reflected in curtailment of production at this particular concentrator.

Open-pit copper mining came to Montana in 1956, courtesy of The Anaconda Company. Also in 1956, the Company marked the first full year of production from its new aluminum reduction plant at Columbia Falls, Montana, near Hungry Horse Dam. In view of the reputation of aluminum as a successful invader of copper markets, the Company appeared to be following the maxim that if one cannot always beat the competition, then perhaps he should join it. In any event, the new plant, operated by the Anaconda Aluminum Company, provided approximately 600 new jobs in the primary metals industry.²⁵ It represented a great boost for the small town of Columbia Falls, which otherwise faced considerable contraction when construction work on Hungry Horse Dam was completed. It also has helped maintain employment in the primary metals industry; since 1956, the plant has been expanded from 2 to 5 potlines and employment has increased from 600 to almost 1,000.²⁶ Alumina (the raw material used in making aluminum) originally came from Texas and Arkansas; later the company turned to the Caribbean. In 1969,

25. Maxine C. Johnson, The Effects of the Anaconda Aluminum Company Plant on Flathead County, Montana, Regional Study 12 (Missoula, Montana: Bureau of Business and Economic Research, Montana State University [now University of Montana], 1960), table 9, p. 52. (Anaconda Aluminum Company)

26. Reply to telephone inquiry of Personnel Director, Anaconda Aluminum Company, Columbia Falls, Montana (April 1970).

Jamaican alumina shipments began arriving through new dock facilities at Everett, Washington. The low cost of on-site power from Hungry Horse Dam helps offset the high costs involved in transporting the raw materials.

The aluminum plant has provided badly-needed jobs in Columbia Falls and Flathead County, but it also has created a serious environmental problem in the county and in adjacent Glacier National Park. As the plant has expanded, the effects of its emissions on the surrounding vegetation have become more severe. There is a possibility that The Anaconda Company may close the plant--which appears to be poorly located with respect to everything but its source of power--rather than attempt to meet the proposed emission standards of the state. These standards have not yet been established and the case of the Columbia Falls aluminum plant provides a striking example of the dilemma more and more state agencies and affected communities throughout the United States will face as attempts are made to solve environmental problems.

Montana's metals industry in 1969, then, consisted mostly of The Anaconda Company's operations in Butte, Anaconda, Great Falls, East Helena, and Columbia Falls. At Butte, the Company produced 99.8 percent of the state's copper output in 1969, as well as 80 percent of the silver and 68 percent of the gold. Total value of production of the three metals in Silver Bow County in 1969 was \$112.3 million. Estimated total value of all metals produced in the state that year was \$116 million.²⁷

The Company's smelter at Anaconda processes concentrates from Butte and from Nevada mines. At Great Falls, electrolytic plants process

27. Preliminary figures from U.S. Department of the Interior, Bureau of Mines, "The Mineral Industry of Montana in 1969," Mineral Industry Surveys, Preliminary Annual Report (Albany, Oregon, 1969), tables 1 and 5.

copper and zinc from Anaconda's mines and from various small producers, as well as zinc oxide from its fuming plant at East Helena. (Zinc oxide is a powder formed when vaporized zinc reacts with air.) The Anaconda Wire and Cable Company, a fabricating subsidiary, operates a wire mill at Great Falls. The Columbia Falls reduction plant ships some aluminum to the Great Falls mill, but most of its product goes out of the state for further processing.

In addition to The Anaconda Company operations, a few independent copper, zinc, lead, silver, and gold mines operated in the state in 1969. Fourteen thousand tons of iron ore were shipped from an open-pit mine near Radersburg for use in specialty cements. Tungsten production, an off-again on-again proposition except for the years 1950 to 1961 when a government stockpiling program was in operation, ceased in June 1969 when a rebuilt mill in Beaverhead County did not function according to expectations. Chromite production in Stillwater County stopped in 1961, when a federal stockpiling contract ended. The production of manganese, mined for many years at Philipsburg and Butte, ended in 1967, although some shipments still were being made from stockpiles.

At Helena, the American Smelting and Refining Company smelts lead ores from Idaho and Montana.

Altogether, metal mining accounted for only 41 percent of the total value of mineral production in 1969; indeed, the estimated total value of all metal output amounted to less than the value of crude petroleum produced--approximately \$116 million as compared to \$119 million (table 2.1). But metal mining and primary metals combined provided approximately two-thirds

of the employment in the mineral industries (table 2.3). Because this employment is concentrated in only a few counties, it has considerable significance in those areas. Table 2.5 shows the degree of concentration of income from mining activity in 1966. Region IV (which includes Butte) accounted for 65 percent of total earnings (wages and salaries, other labor income, and proprietors' income) from mining in the state. In Silver Bow County, earnings (mostly wages and salaries and other labor income) from mining amounted to 37 percent of total earnings in the county.²⁸ This figure does not include The Anaconda Company's profits.

The effects of declining employment in the minerals industries in Butte and in Anaconda have been clear. The population of Silver Bow County, 48,422 in 1950, declined to 46,454 in 1960, and to 41,656 in 1970. The effect was delayed in Deer Lodge County--between 1950 and 1960 the number of residents rose from 16,583 to 18,640--but by 1970, the county population had declined to 15,459.²⁹

Perhaps retail sales figures tell the story as well as any data available. After the effects of increased price levels are considered (the prices of retail goods rose approximately 16 percent between 1954 and 1967), retail sales in Silver Bow and Deer Lodge Counties rose little or not at all during the 13 years:

28. U.S. Department of Commerce, Office of Business Economics, unpublished data (Washington, D.C., February 1969).

29. U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: 1960, Number of Inhabitants, Montana, Final Report PC(1)-28A (Washington, D.C.: U.S. Government Printing Office, 1960), table 6, p. 28-11; and Henry H. Smith, "Montana's Population Shown to be 682,133 in Preliminary 1970 Census Counts," Commerce News, U.S. Department of Commerce, CB70-63 (Washington, D.C., June 1, 1970).

TABLE 2.5

Total Earnings from Mining, by Economic Region^a, Montana, 1966

Region	Mining Earnings (\$'000)	Percentage of Total Earnings
State	59,000	4.0
Region Ia	1,253 ^b	0.5
Region II ^c	3,732 ^d	0.9
Region III ^e	2,588 ^f	1.8
Region IV ^g	38,367 ^h	11.6
Region V ⁱ	4,537 ^j	1.9
Region VI ^k	1,715 ^l	2.4

Sources: [Region earnings] U.S. Department of Commerce, Office of Business Economics, unpublished data (Washington, D.C., February 1969).

[State earnings] U.S. Department of Commerce, Office of Business Economics, Survey of Current Business, vol. 47, no. 8 (August 1967), table 70, p. 37.

Notes: Earnings figures represent income from current participation in the labor force: wages and salaries, other labor income, and proprietors' income.

Total may not add due to rounding; and due to incomplete data for regions indicated, resulting from the exclusion of certain county data either to avoid disclosure or because of insufficient data. Total exclusions amount to \$6.8 million.

Since 1966 the state total has been revised to \$58 million, or 3.9 percent of total earnings.

^aIncludes Flathead, Granite, Lake, Lincoln, Mineral, Missoula, Ravalli, and Sanders Counties.

^bExcludes data for Lincoln and Ravalli Counties which were withheld to avoid disclosure.

^cIncludes Blaine, Cascade, Chouteau, Fergus, Glacier, Hill, Judith Basin, Liberty, Meagher, Petroleum, Phillips, Pondera, Teton, and Toole Counties.

^dExcludes data for Blaine, Liberty, Meagher, Petroleum, and Phillips Counties which were withheld to avoid disclosure. Also excludes data for Chouteau County because of insufficient data.

^eIncludes Daniels, Dawson, McCone, Richland, Roosevelt, Sheridan, Valley, and Wibaux Counties.

^fExcludes data for Valley and Wibaux Counties which were withheld to avoid disclosure.

^gIncludes Beaverhead, Broadwater, Deer Lodge, Gallatin, Jefferson, Lewis and Clark, Madison, Park, Powell, and Silver Bow Counties.

^hExcludes data for Deer Lodge, Gallatin, and Madison Counties which were withheld to avoid disclosure.

ⁱIncludes Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Treasure, Wheatland, and Yellowstone Counties.

^jExcludes data for Golden Valley, Treasure, and Wheatland Counties because of insufficient data.

^kIncludes Carter, Custer, Fallon, Garfield, Powder River, Prairie, and Rosebud Counties.

^lExcludes data for Garfield County which were withheld to avoid disclosure.

	<u>Silver Bow County</u>	<u>Deer Lodge County</u>
<i>Retail sales in dollars:</i> ³⁰		
1954	\$64,409,000	\$15,589,000
1958	67,822,000	18,785,000
1963	68,574,000	16,333,000
1967	73,525,000	18,419,000
<i>Percentage increase, 1954-1967:</i>	14.2%	18.2%
<i>Increase in all commodities component, Consumer Price Index, 1954-1967:</i> ³¹	16.4%	

Both 1954 and 1967 were strike years.

The retail sales figures available from the Census of Business depict the lack of growth in Butte and Anaconda. Because they are not available on a monthly or even an annual basis, they cannot document the instability created by the ups and downs in employment which are common to the mining and smelting industries. When large numbers of workers are laid off, or are out on strike, the whole community suffers. Government operations also are affected--heavy demands for welfare assistance and unemployment insurance payments, for instance--can and have created financial strains for local and state agencies.

Metal mining jobs in general are well-paying jobs, and this has made the loss more severe. In 1968, metal miners were being paid at an average annual rate of \$8,200 (table 2.6); but because most miners were on strike

30. U.S. Department of Commerce, Bureau of the Census, U.S. Census of Business: 1958, Retail Trade, Montana, BC58-RA26 (Washington, D.C.: U.S. Government Printing Office, 1960), table 102A, p. 26-18; U.S. Department of Commerce, Bureau of the Census, U.S. Census of Business: 1963, Retail Trade, Montana, BC63-RA28 (Washington, D.C.: U.S. Government Printing Office, 1964), table 9, p. 28-20; and U.S. Department of Commerce, Bureau of the Census, U.S. Census of Business: 1967, Retail Trade, Montana, BC67-RA28 (Washington, D.C.: U.S. Government Printing Office, 1969), tables 3 and 8, pp. 28-10 and 28-18.

31. U.S. Department of Labor, Bureau of Labor Statistics, Handbook of Labor Statistics: 1968, Bulletin 1600 (Washington, D.C.: U.S. Government Printing Office, 1968), table 104, p. 238.

TABLE 2.6
Employment and Earnings in Montana's Metals Industries, 1968

<u>Industry</u>	<u>Average Monthly Employment^a</u>	<u>Average Earnings (Annual Rate)</u>
Metal mining ^b	2,406	\$8,209
Copper ores	2,119	8,449
Lead and zinc ores	69	6,386
Gold and silver ores	103	5,719
Ferroalloy ores, except vanadium	38	7,949
Metal mining services	71	6,856
All other metal mining	6	5,003
Primary metal industries ^b	3,713	7,136
Primary smelting and refining of nonferrous metals ^c	3,515	7,134
Rolling, drawing, and extruding of nonferrous metals ^d	137	7,378
All other primary metal products	61	6,706

Source: Employment Security Commission of Montana, unpublished data (Helena, Montana).

^aWage and salary workers.

^bAnaconda Company workers were on strike during the first 3 months of 1968. In 1969, average monthly employment was 3,300 in metal mining and 4,700 in primary metals. No further breakdown is available for 1969.

^cIncludes copper, lead, zinc, aluminum, silver, and gold.

^dIncludes copper and aluminum wire, rod, and cable.

for the first three months of that year, their actual pay was considerably less. Smelter workers earn lower incomes, but still their wages are above the average of most wage and salary workers. Their average annual rate of earnings was \$7,136 in 1968 (table 2.6). All Montana workers covered by unemployment insurance earned at a rate of \$5,579 per year in 1968.³²

Among the interesting developments in metal mining employment has been the changing seasonal pattern. In the 1940s and early 1950s, when all mining was underground, employment in the mines reached a high point in the winter and a low in the summer, nicely in contrast to the typical seasonal pattern in the state. Since 1956, when open-pit operations began, this pattern has been reversed: as in most other industries, employment now reaches its peak in the summer when the weather is good and declines in the winter. Neither industry is unusually seasonal for Montana. Seasonal fluctuations above and below the average sometimes amount to 10 percent of total metal mining employment. The number of smelting workers also may vary up to 10 percent during the year.

The Outlook

It is difficult to predict what the next few years may bring to Montana's metals industry. Copper production facilities throughout the world have been expanded in the late 1960s. The Anaconda Company, it might be noted, recently completed a new open-pit mine near Tucson, Arizona. There has been speculation that overcapacity may be in the offing for the 1970s, particularly if American participation in the Vietnam War should end.

32. According to data from the Employment Security Commission of Montana, workers covered by unemployment insurance make up approximately 63 percent of all nonagricultural wage and salary workers and 48 percent of the employed labor force.

Nationally, both metal mining and primary metals have been slow-growth industries since 1950. Output has increased, but not as rapidly as for many other goods and services; employment has declined in metal mining and increased only slightly in primary metals. The National Planning Association projects small increases in output and a decline in employment in both industry groups between 1968 and 1980.³³

On the other hand, The Anaconda Company has announced the possibility of two new open-pit copper developments in Montana--one in the Heddleston district north of Helena and another near Nye in the Stillwater area. The Kennecott Corporation is doing developmental work in Sanders County. Regardless of what happens in the rest of the country, development of one or more of these deposits could increase employment in Montana's metals industry significantly and surely would have a profound economic effect on the areas involved. At this writing, a decision on the development near Lincoln seems most imminent. No information is available as to the extent of the proposed operation or its probable employment. According to one statement by a company official, it would take as long as two and one-half years to get into production if Anaconda decides to go ahead.³⁴

The possibility of the project, however, has generated considerable controversy because of possible harm to the environment in the Blackfoot Valley and to the small community of Lincoln. Many Montanans no longer

33. Ahmad Al-Samarrie, Economic Projections to 1980: Growth Patterns for the Coming Decade, National Planning Association, Center for Economic Projections, National Economic Projections Series, Report 70-N-1 (Washington, D.C.: National Planning Association, 1970), tables VI-4 and VI-8, pp. S-62 and S-70.

34. P. L. MacDonald, Montana Kaimin, February 24, 1970, p. 1.

are willing to sacrifice the destruction or deterioration of the environment for the sake of economic development. They rightfully demand assurance of adequate precautions and controls before the development occurs. At the same time, most Montana citizens are also concerned with economic welfare. They would be well advised, in this instance, to contrast the effects on individual economic welfare of a mining development such as The Anaconda Company apparently proposes near Lincoln (assuming adequate safeguards for the environment) with that of a large-scale recreational development (which also can create ecological problems). While the one would create jobs where workers earned at the rate of \$8,400 in 1968 (table 2.3--copper mining), the other would result in highly seasonal employment in businesses where in 1968 annual earnings ranged from \$2,600 (in eating and drinking places and hotels) to \$5,000 (in auto dealerships and gas stations) for year-round employees. (See Chapter 5, "The Trade, Service, and Finance Industries," table 5.4.)

At the present time, expansion of copper production facilities appears to represent the most likely possibility for the expansion of metal mining in Montana. The time may come when other metals known to exist in the state, or produced in the past, may be exploited economically. Barring federal incentive programs designed to encourage and subsidize production, that time probably is some years away. But we project that at least three new areas will be opened up to copper mining by 1980, and that employment in metal mining, which averaged 3,300 in 1969, should increase to approximately 4,200 in 1980.³⁵

35. Projections of employment in Montana, by major industry group, are set forth in "The Montana Economy," Research Report of the Montana Economic Study, pt. 1, chap. 4.

The prospects for smelting and refining activities in Montana are highly uncertain at the present time. The old copper concentrator now operating at Anaconda is not an efficient operation; unless prices are high, it cannot operate economically. Its days are probably limited. There is a question as to whether the Anaconda Aluminum plant at Columbia Falls will continue to operate in the face of the proposed air pollution standards; the same doubts obtain for the American Smelting and Refining plant at East Helena. On the other hand, increased copper production might result in new smelting facilities in the state. But new facilities would require fewer workers in relation to output. In the face of all these uncertainties, any projected employment figure for 1980 is very much of a guess: our best estimate is that the industry will employ 4,000 workers in 1980, the same as in 1960 and about 700 less than in 1969.³⁶

Combined, the projections for metal mining and smelting and refining anticipate 8,200 workers in 1980, or only about 200 more than the average monthly employment in 1969. This means, of course, that the importance of the metals industries as a source of employment for Montana workers will continue to decline.

Bituminous Coal and Lignite Mining

At the present time, there is great interest in the possibility of the development of eastern Montana's huge subbituminous coal and lignite resources.³⁷ Coals are ranked into four general classes: anthracite,

36. Ibid.

37. This section is based partly on an unpublished paper by James Merrick, graduate student in business administration at the University of Montana, entitled "Aspects of Montana's Coal Utilization and Potential."

bituminous, subbituminous, and lignite. Anthracite is hard coal; bituminous is soft coal. Lignite is a coal in which the alteration of vegetal matter has proceeded further than in peat but not so far as in bituminous coal. Subbituminous, of course, lies between lignite and bituminous coal. Nearly all the coal in Montana is either subbituminous or lignite.

The state contains about 13 percent of the coal resources of the United States and ranks second only to North Dakota in reserves originally present. Estimates of Montana's total original reserves range from 200 billion tons to 378 billion tons. The Montana Bureau of Mines and Geology says that only 238 million tons of coal have been mined in the state since mining began. Table 2.7 shows how an estimated 222 billion tons is distributed among Montana counties. Over half this tonnage is in Big Horn, Powder River, and Rosebud Counties.

More meaningful estimates involve the number of tons amenable to strip mining; most of these figures fall between 13 and 17 billion tons and probably are conservative.³⁸ It is, of course, these low-cost, easily recoverable reserves of strippable subbituminous coal that would provide the basis for an expansion of the coal industry. Again, Big Horn, Powder River, and Rosebud Counties contain the largest deposits.

A Brief History

In the early days, coal served as the principal source of power for transportation and industry in Montana. The railroads and the smelters provided the major markets for coal. The first mine of significance began

38. Robert E. Matson, "Montana's Strippable Coal Resources," Proceedings of the Montana Coal Symposium, Eastern Montana College, Billings, Montana, 1969 (Billings, Montana: Empire Printing, Inc., 1970), pp. 80-81.

TABLE 2.7

Estimated Original Coal Reserves in Montana, by County
(In Millions of Short Tons)

County	Bituminous Coal	Subbituminous Coal	Lignite	Total
- Big Horn	---	43,500.65	---	43,500.65
Blaine	---	39.73	---	39.73
Broadwater	5.66	---	---	5.66
Carbon	1,247.22	---	---	1,247.22
Carter	---	---	463.47 ^a	463.47 ^a
Cascade	435.12	---	---	435.12
Chouteau	---	1.48	---	1.48
- Custer	---	2,678.86	2,198.85 ^a	4,877.71 ^a
Daniels	---	---	3,964.72	3,964.72
- Dawson	---	---	11,110.49 ^a	11,110.49 ^a
- Fallon	---	---	2,544.08 ^a	2,544.08 ^a
Fergus	341.40	1.54	---	342.94
Garfield	---	612.74	(^a)	612.74 ^a
Glacier	33.36	---	---	33.36
Granite	---	---	23.00	23.00
Hill	---	76.55	---	76.55
Judith Basin	243.93	---	---	243.93
- McCone	---	---	24,871.57	24,871.57
Meagher	.53	---	---	.53
Missoula	---	---	19.70	19.70
- Musselshell	---	3,471.49	---	3,471.79
Park	20.83	12.40	---	33.23
Phillips	---	3.50	---	3.50
Pondera	21.89	---	---	21.89
- Powder River	---	40,984.48	2,433.69	43,418.17
Prairie	---	---	1,581.27 ^a	1,581.27 ^a
- Richland	---	---	21,085.62 ^a	21,085.62 ^a
- Roosevelt	---	---	4,164.23 ^a	4,164.23 ^a
- Rosebud	---	38,873.78	10.10 ^a	38,883.88 ^a
- Sheridan	---	---	5,763.82 ^a	5,763.82 ^a
Stillwater	12.67	---	---	12.67
- Treasure	---	1,303.66	---	1,303.66
Valley	---	---	257.93	257.93
- Wibaux	---	---	7,040.73 ^a	7,040.73 ^a
Yellowstone	---	590.20	---	590.20
Total	<u>2,362.61</u>	<u>132,151.06</u>	<u>87,533.27^a</u>	<u>222,046.94^a</u>

Source: U.S. Congress, Senate Committee on Interior and Insular Affairs, Mineral and Water Resources of Montana, Report of the U.S. Geological Survey in collaboration with Montana Bureau of Mines and Geology, Committee Print, 88th Congress, 1st Session (Washington, D.C.: U.S. Government Printing Office, 1963), p. 46.

^aIncomplete.

operation in Gallatin County in 1867. In 1882-83, it was purchased by the Northern Pacific Railroad. Later in the decade, mines at Red Lodge in Carbon County were developed by a Northern Pacific subsidiary, the Northwest Improvement Company. In 1924, Foley Brothers, Inc., opened an open-pit mine at Colstrip, in Rosebud County, designed to supply more coal to the Northern Pacific. The mine was hailed as a "milestone in the economic progress of this industrial age."³⁹ It was the first completely electrified open-pit mine in the country and would soon become the leading coal producer in the state.

For many years, mines at Belt, Stockett, and Sand Coulee in Cascade County supplied coal and coke for the Great Northern Railroad and The Anaconda Company smelters at Great Falls, Butte, and Anaconda. The Milwaukee Railroad's Republic Coal Company developed mines in Musselshell County.

Until recently, except for periods of national emergency, Montana coal mines have served local markets--mostly Montana railroads and industry. The state was too remote from major markets and its coal could not compete with higher-quality products from other western states. During World War I, 4.5 million tons of coal were produced; this figure was not exceeded (and seldom approached) until World War II, when 4.8 million tons were produced in 1943 and 1944.⁴⁰ In general, however, coal production declined after World War I as the discovery of natural gas and oil and the development

39. Burlingame and Toole, A History of Montana, vol. 1, p. 365. (Coal Age, vol. 28 [November 12, 1925], p. 660)

40. U.S. Department of the Interior, Mineral Resources of the United States: 1919, p. 138A; and U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1945 (Washington, D.C.: U.S. Government Printing Office, 1947), p. 61.

of hydroelectric facilities in Montana resulted in a lessened demand for coal, especially on the part of the state's industry.

In the early 1940s, Montana railroads began to convert from steam to diesel locomotives. The process was slowed by the war, but by 1957 the conversion of the three major railroads was completed. Coal production, which had amounted to 2.5 million to 3 million tons immediately after World War II fell to less than half a million tons in 1957 and stayed there until 1968.⁴¹ The major consumer during this period was the Montana-Dakota Utilities steam plant at Sidney.

None of these developments were unique to Montana, of course. In the United States as a whole, coal provided for 75 percent of total energy requirements in 1910; in 1962, the proportion had fallen to 22 percent. Since then, coal has been holding its own and perhaps gaining a little.⁴²

The Industry Today

In 1968, fewer than 100 workers were employed in coal mining in Montana (table 2.3); they produced just over 500,000 tons, valued at \$2.1 million.⁴³ During World War I, approximately 4,700 men had been

41. U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1950 (Washington, D.C.: U.S. Government Printing Office, 1953), table 5, p. 42; U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1951 (Washington, D.C.: U.S. Government Printing Office, 1954), table 5, p. 58; U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1960, Area Reports, Domestic, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1961), table 5, p. 22; and U.S. Department of the Interior, "The Mineral Industry of Montana in 1969," table 1.

42. S. David Freeman, "Energy and the Environment in the Years Ahead," Proceedings of the Montana Coal Symposium, Eastern Montana College, Billings, Montana, 1969 (Billings, Montana: Empire Printing, Inc., 1970), p. 6.

43. U.S. Department of the Interior, "The Mineral Industry of Montana in 1969," table 1.

employed to produce 4.5 million tons;⁴⁴ in World War II, production was slightly larger (4.8 million tons), but only 1,500 workers were required.⁴⁵

The 1968 production figure (half a million tons) was low, but it represented an increase over the 11 preceding years when strip mining was resumed at Colstrip (closed since 1958) to supply The Montana Power Company's new coal-fired steam electric generating plant at Billings (figure 2.5). In 1969, output was up again--this time to 850,000 tons--as shipment of coal to Minnesota began. Employment remained at about 100 persons (table 2.3). Yet the news media throughout the year was full of reports of the potential of coal; perhaps the industry, as of 1970, could most accurately be described as small and relatively unimportant, but full of hope. The outlook for immediate expansion is based upon a continued increase in the use of coal in the generation of electricity.

Most of the 1969 production came from the strip mines at Colstrip, Rosebud County, and from mines in Richland County. The Richland County mines, operated by a subsidiary of the Montana-Dakota Utilities Company, supply fuel for that firm's steam generating plant at Sidney. The Colstrip mines supply coal to The Montana Power Company plant at Billings and to the Minnesota Power and Light Company, Cohasset, Minnesota. The unit

44. Thomas Morgan, "History of Coal Mining in Montana," in Proceedings of the First Montana Coal Resources Symposium, ed. S. L. Groff, State of Montana, Bureau of Mines and Geology, Special Publication 36 (Butte, Montana: Montana College of Mineral Science and Technology, 1966), p. 5; and U.S. Department of the Interior, Mineral Resources of the United States: 1919, p. 138A.

45. U.S. Department of the Interior, Minerals Yearbook: 1945, p. 61; and Hoflich and Johnson, The Economy of Montana, table 23, p. 54. (Unemployment Compensation Commission of Montana [now Employment Security Commission of Montana])

FIGURE 2.5
Coal Production and Employment, Montana, 1950-1969



Sources: [Coal production, 1950-1969] Same as for copper production data in figure 2.2.

[Employment, 1950-1969] Employment Security Commission of Montana and U.S. Department of Labor, Bureau of Labor Statistics, "Employees on Montana Non-agricultural Payrolls," Montana Labor Market: Employment Series by Months, Supplement 1 (Helena, Montana), and unpublished data.

Note: The employment figures are somewhat misleading because they are rounded to hundreds. Actual employment between 1960 and 1969 varied from 73 (rounded to 100) to 174 (rounded to 200). Wage and salary workers only.

train, a new approach to transportation of coal in Montana, appears to have made Montana coal competitive in the upper Midwest. Unit trains made up of 100 hopper-bottom cars, each containing about 105 tons, deliver coal from the Peabody Coal Company in Rosebud County to the Cohasset, Minnesota, plant. By 1973, when a large new unit is added to the plant, between 2 and 3 million tons of Montana coal will be used annually.⁴⁶ This alone means that coal production in the state will be at least three times greater in 1973 or 1974 than it was in 1969.

A news report February 21, 1970, indicated that the Western Energy Company, a subsidiary of The Montana Power Company, had signed a six-year contract agreeing to supply Northern States Power Company of Minneapolis with one-half million tons of coal annually, beginning March 1.⁴⁷

The Outlook

It is quite likely that more out-of-state markets for Montana coal will be established. One reason is that coal produced in Montana and in other parts of the West has a lower sulfur content than coal from the eastern and central United States. The concern over sulfur oxides and other pollutant gases released by coal-fired generating plants has focused attention on the use of western coal.

The successful use of unit trains probably means that most Montana coal will be transported by rail. The possibility of slurry pipelines also

46. Elwood F. McGuire, "Coal Export by Rail from Montana to Minnesota," Proceedings of the Montana Coal Symposium, Eastern Montana College, Billings, Montana, 1969 (Billings, Montana: Empire Printing, Inc., 1970), p. 21.

47. "Eastern Montana Coal Will Go to Minnesota Under Contract," The Missoulian (Montana), February 21, 1970, p. 2.

exists; a report at the Montana Coal Symposium described a new line being constructed in Arizona.⁴⁸

There are indications that other steam plants may be constructed in Montana. Predictions to this effect are based in part upon the possibility of large mine-mouth generating plants using extra-high voltage transmission lines to supply electric power produced in Montana to the Pacific Northwest and the Midwest. The location of new generating plants will be determined by several considerations, among them distance from the coal fields, adequacy of the water supply, distance to electric load centers, possible environmental effects, and the attitude of the community involved. One possible site is the Tongue River reservoir area southeast of Billings; another is Great Falls, which has been named as a potential site for a Montana Power Company plant.⁴⁹

Other possible uses of Montana coal seem to lie further in the future. One possibility is its conversion to electrical energy through the use of a technique called magnetohydrodynamics (MHD). Such plants involve less thermal pollution per unit of electricity produced than do the steam generating plants now in use. MHD technology, however, requires additional research and development before it can be used commercially.⁵⁰

48. Edward J. Wasp, "The Importance of Slurry Pipelines for Western Coal Development," Proceedings of the Montana Coal Symposium, Eastern Montana College, Billings, Montana, 1969 (Billings, Montana: Empire Printing, Inc., 1970), p. 75.

49. "Montana Power Plant Ushers in a New Era for Coal," Great Falls (Montana) Tribune, September 22, 1968, p. 6.

50. Kenneth A. Roe, "Engineering Aspects of Magneto Hydro Dynamics (MHD)," Proceedings of the Montana Coal Symposium, Eastern Montana College, Billings, Montana, 1969 (Billings, Montana: Empire Printing, Inc., 1970), p. 163.

A second potential use of Montana coal involves liquefaction--that is, the production of synthetic fuels, including natural gas, gasoline and fuel oils. There is little doubt that the process of liquefying coal eventually will become economical; the time will depend upon such factors as technological developments in liquefaction and in the much-discussed conversion of oil shale--which would make for a potential competitor--and upon oil import policies and the success of future oil and gas exploration efforts.

The comments above confirm the premise that the immediate development of Montana's coal potential is dependent upon steam generating plants. There are, however, a number of possible limitations and a number of reasons to question some of the more enthusiastic endorsements and predictions concerning the extent of coal mining development. In the first place, Montana is in competition as a major source of coal with North Dakota and Wyoming. Those states also expect to share in the expanded use of coal resources. Secondly, steam plants use large quantities of water. Additional storage to offset low water flows in dry seasons probably will become necessary which means competition from other water users may be expected. Third, there is also the likelihood that the use of coal for generating plants may be a short-term development. One expert puts it this way: ". . . no matter how hard coal tries, somewhere down the road--sooner or later--there will undoubtedly be more and more nuclear power plants that will be able to undersell it."⁵¹

51. Freeman, "Energy and the Environment in the Years Ahead," Proceedings of the Montana Coal Symposium, p. 13.

Another urgent and complex set of considerations involves the environmental deterioration which frequently is associated with strip mining and steam generating plants. The list of potential threats is long: the disturbance of the topography in strip mining; the thermal pollution--that is, the heating of water--in the generating process and its potential harm to fish resources; the emission of sulfur oxide and other pollutant gases from the plant smokestacks; and, if one visualizes huge mine-mouth plants, the scenic pollution involved in great transmission lines to transport power from one region to another. Some of these problems can be solved more easily than others. All of the solutions will be costly. Disturbed lands can be restored and transmission lines can be put underground. Given the present state of technology, however, there will be air pollution and there will be thermal pollution.

Interestingly, in all the discussions of coal development, no one promises a glowing potential employment picture. The fact is that although we are talking of millions of tons of coal, we seem to be talking of new jobs numbering only in the hundreds, at least for the foreseeable future. One worker in a strip mine can produce approximately 25,000 tons of coal per year, assuming an output of 100 tons per man-day. This means that for every one million ton increase in total production, only 40 additional mine workers will be required. In the projections for mining employment, coal and the miscellaneous category of other nonmetallic minerals were combined. Total employment in all these industries in 1980 is estimated at 1,200;⁵² the figure in 1969 was 800 (table 2.3). Most of this increase probably would occur in coal production.

52. See "The Montana Economy," Research Report of the Montana Economic Study, pt. 1, chap. 4.

Compared to other mining industries, the pay is low in coal mining. In 1968, workers were paid at the rate of \$5,900 per year, compared to \$8,200 for metal miners and an average of \$7,560 for all miners (table 2.2). The jobs would not be seasonal; except on the most severe winter days, operations would be continuous as operators fulfilled contracts with generating plants.

Employment in steam plants depends upon the degree of automation and the size of the installation, and may vary from 10 to 20 workers per 100 MW (megawatts). Montana's present steam generating capacity is less than 300 MW; if it were to increase to 3,000 MW, this would mean another 300 to 600 jobs. These jobs would be included in the electric utilities classification.

One might logically question whether, if large quantities of electrical power were to be generated in eastern Montana, this would not be an invitation to at least some industrialization on the part of power-oriented firms? The probable answer is no; the cost of electricity generated in steam plants will not be that low. There is little likelihood as things now stand that the availability of relatively inexpensive power will offset the disadvantages of distance from markets and from raw materials.

What this means, then, is that coal production in Montana probably will increase substantially during the 1970s, but the total number of new jobs created will not be large--not more than a few hundred. They will be important to the communities involved, of course. But because the benefits, as measured by the amount of direct new employment, will be limited, Montanans should give careful consideration to whatever social costs, in the form of environmental degradation, may be involved.

The Petroleum and Gas Industries

Eastern Montana's petroleum industry is relatively young, going back only as far as the 1920s. Compared to other mining activities, its development has been slow and sedate; the frontier days were gone when oil came upon the scene.

The presence of crude oil had been noted periodically in Montana since 1864. Around the turn of the century, two brief and ill-starred oil booms took place in what is now Glacier National Park: in the Kintla Lake area north of Kalispell in 1901 and north of St. Mary Lake in 1902. But the first commercial production of any consequence did not begin until late 1915 in the Montana portion of the Elk Basin field in Carbon County, and oil production did not assume any great importance in the state until the 1920s after the discovery of the Cat Creek field in Petroleum and Garfield Counties and the Kevin-Sunburst field in Toole County. Natural gas production has never been a major activity in the state; from the beginning the emphasis has been on oil production. No oil has been produced west of the Continental Divide.

The petroleum industry is a capital-intensive industry. Wells and refineries employ few workers, and average output per employee is high. Tables 2.1 and 2.3 show that in 1969, while 3,300 metal miners produced approximately \$116 million worth of metals, 2,000 workers in production, drilling, and exploration services produced crude oil and natural gas valued at \$121 million. These 2,000 employees, plus 1,000 at work in refineries, accounted for a little more than 1 percent of the total employed labor force in Montana. On the average, they were among the highest paid workers in Montana (table 2.8). The 44.3 million barrels of

TABLE 2.8

Employment and Earnings in Montana's Petroleum Industries, 1968

<u>Industry</u>	<u>Average Monthly Employment</u>	<u>Average Earnings (Annual Rate)</u>
Crude petroleum and natural gas	2,116	\$7,505
Crude petroleum and natural gas	620	7,672
Natural gas liquids	12	8,110
Oil and gas field services	1,484	7,431
Petroleum refining and related industries	1,176	8,880
Petroleum refining	1,176	8,880

Source: Employment Security Commission of Montana, unpublished data (Helena, Montana).

Notes: In 1968, 169 workers were employed in petroleum pipeline transportation, classified in the transportation, communication, electric, gas, and sanitary services industry group. Their average earnings in 1968 were \$8,978. Separate figures are not available for persons working on natural gas lines.

Wage and salary workers only.

crude oil produced in 1969 amounted to 1 percent of total United States output. Montana refining capacity, at 125,000 barrels per day on January 1, 1969, also was equal to 1 percent of United States capacity.⁵³

Oil Production and Refining

Early exploration work in Montana was financed by local people; major producers were not impressed with Montana's prospects. According to a Montana Magazine of History article, the gradual conversion of coal-burning locomotives to oil burners by the Great Northern Railroad during the years after 1910 created a potential market for fuel oil in Montana and stimulated interest in oil production.⁵⁴ Still, until late in 1919, the decade saw only one commercial discovery--the strike in the Montana portion of the Elk Basin field, Carbon County, in 1915 by the Ohio Oil Company. Elk Basin was to become Montana's first permanent oil field.

In December 1919, a Denver company struck oil in what is now the Cat Creek field in Petroleum and Garfield Counties. But the most notable discovery of the period occurred in northern Montana in 1922, when the first oil was produced from the Kevin-Sunburst field in Toole County. Kevin-Sunburst has become one of the major Montana fields. Although its

53. U.S. Department of the Interior, Bureau of Mines, "Petroleum Refineries in the United States and Puerto Rico, January 1, 1969," Mineral Industry Surveys (Washington, D.C., August 29, 1969), table 2, pp. 7-8.

54. Much of this discussion is based on a series of four articles by Don Douma under the general title "Second Bonanza, The History of Oil in Montana" which appeared in the Montana Magazine of History, Autumn 1953 and Winter, Spring, and Summer 1954 issues, and in U.S. Congress, Mineral and Water Resources.

production was small in 1968 and other fields were threatening to overtake it, it ranked second only to the Cut Bank field in cumulative production at year's end, 1968.⁵⁵

Two other major discoveries occurred in the 10 years after Kevin-Sunburst--the Pondera field in Pondera and Teton Counties in 1927 and the Cut Bank field in Glacier and Toole Counties in 1932. Although oil was discovered there during the depression (when output from other Montana fields was declining), the Cut Bank field experienced a rapid development. This was partly because it produced a higher-quality crude than either the Kevin-Sunburst or Pondera, but mostly because several large companies were interested in the field and proceeded to develop it. The Montana Power Company held a block of 200 square miles in the gas-producing northeastern section of the field; Texaco had more than 60,000 acres under lease.

Oil production during the twenties and thirties, then, was concentrated in northern Montana, in Glacier, Toole, and Pondera Counties. Numerous small refineries were established and surplus crude was sold in Canada until 1937, when oil was discovered in the Turner Valley in Alberta. This loss of a crude market led to the construction of increased refinery capacity in Montana and to fairly successful efforts to tap the eastern Washington market. The Census Bureau reported 28 oil refineries in Montana in 1939. Fourteen of them were in Glacier, Toole, and Pondera Counties.⁵⁶ Most of them were small and inefficient.

55. Oil and Gas Conservation Commission of the State of Montana, Statement of Crude Oil Production and Valuation--All Montana Fields, Year 1968 and Accumulated Totals from Discovery Date (Helena, Montana, 1969).

56. U.S. Department of Commerce, Bureau of the Census, Sixteenth Census of the United States: 1940, Manufactures, 1939, Reports for States and Outlying Areas, vol. 3 (Washington, D.C.: U.S. Government Printing Office, 1942), table 9, p. 584.

During World War II, the sharply increased demand for petroleum and gas products brought some expansion in Montana output. Crude oil output increased from 7.5 million barrels in 1941 to 8.6 million in 1944 (15 percent).⁵⁷ Little exploration took place and few new wells were drilled. Oil men preferred to concentrate their efforts in areas where commercial production possibilities were more certain and costs not so high as in Montana. As a result, most of the production continued to come from the established northern fields. One exception was the Elk Basin field, where an oil discovery at a deeper level made possible the overall increase in crude oil output.

Perhaps the most significant wartime development was the movement of several major oil companies into Montana. Among them were Standard Oil of New Jersey, Union Oil of California, Carter Oil and the Farmers Union Central Exchange. These firms brought capital and expert personnel to the state. Carter Oil and Continental Oil (already operating in the state) constructed new refineries at Billings in the late 1940s. By this time, many of the small refineries scattered around the state had ceased operation.

But things stayed very much the same in the state's petroleum industry until 1951, when oil was discovered in the Williston Basin. The Basin, which underlies northeastern Montana, western North Dakota, northwestern South Dakota, and southern Saskatchewan and Manitoba, had been known as a promising area since 1941; in fact, oil was known to occur at

57. U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1943 (Washington, D.C.: U.S. Government Printing Office, 1945), p. 65; and U.S. Department of the Interior, Bureau of Mines, Minerals Yearbook: 1946 (Washington, D.C.: U.S. Government Printing Office, 1948), pp. 50-51.

great depth in the Cedar Creek Anticline area, but it was then too deep and costly to develop. After World War II, considerable geologic work was done in the area and two dry holes were drilled. Then, in 1951, the Amerada Petroleum Company brought in a commercial well across the border in North Dakota and later Shell Oil completed a successful producing well near Richey in Dawson County. Other fields were soon discovered, and a great scramble for oil leases took place.

The dramatic effects of the Williston Basin discovery on Montana oil production are shown in figure 2.6. In spite of early marketing difficulties (solved by the construction of new pipelines), by 1956 the Williston Basin had more than doubled the output of Montana crude, and made Billings, the nearest major city, the state's oil center.

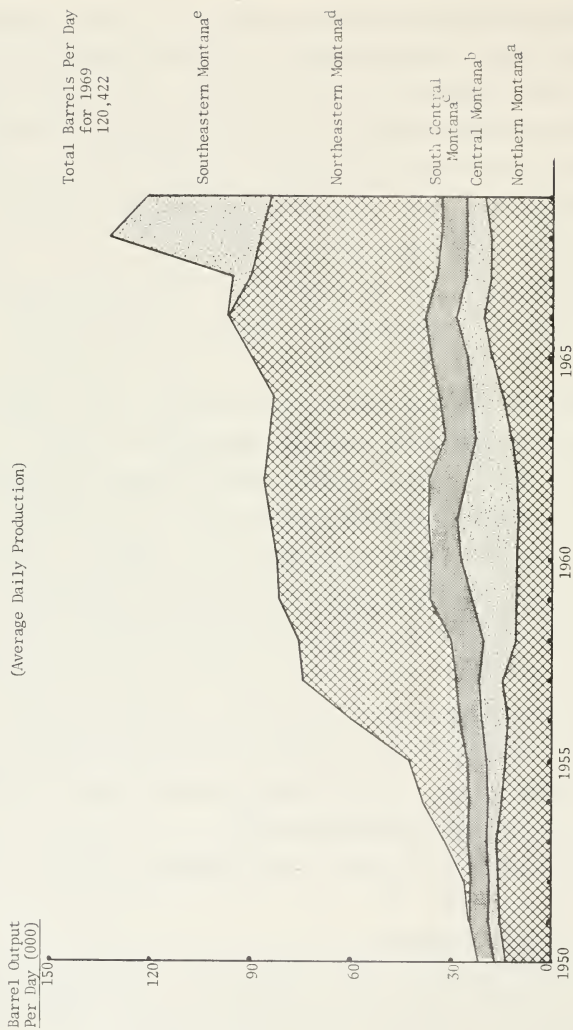
From the early 1950s until the early 1960s, oil helped Billings grow. Several major companies established headquarters in the city after the discovery of the Williston Basin; employment by oil companies in Yellowstone County more than quadrupled between 1950 and 1956. Employment leveled off in 1956 and then, in 1960, some of the oil companies began to pull out. Today, although the scale is smaller, Billings has maintained its position as the center of Montana's oil industry. Numerous major oil producers continue to maintain offices there and the list of services and supply firms is long. In 1969, 87 percent of the state's oil refining capacity was in Billings and nearby Laurel.⁵⁸

The Williston Basin dominated the Montana industry until 1967, when another important discovery was made, this time in the Powder River Basin of southeastern Montana.

58. U.S. Department of the Interior, "Petroleum Refineries in the United States and Puerto Rico, January 1, 1969," table 2, pp. 7-8.

FIGURE 2.6

Crude Oil Production in Montana, 1950-1969



Sources: [Total production, 1950] Oil Conservation Board of the State of Montana, Statement of Crude Oil Produced and Valuation, All Montana Fields, Year 1950 and Accumulated Totals from Discovery Dates (Helena, Montana, May 1951).

[Total production, 1951] Oil Conservation Board of the State of Montana, Statement of Crude Oil Produced and Valuation, All Montana Fields, Year 1951 and Accumulated Totals from Discovery Dates (Helena, Montana).

[Total production, 1952] Oil Conservation Board of the State of Montana, Statement of Crude Oil Produced and Valuation, All Montana Fields, Year 1952 and Accumulated Totals from Discovery Dates (Helena, Montana).

[Total production, 1953] Oil and Gas Conservation Commission of the State of Montana, Statement of Crude Oil Production and Valuation, All Montana Fields, Year 1953 and Accumulated Totals from Discovery Dates (Helena, Montana).

[Total production, 1954] Oil and Gas Conservation Commission of the State of Montana, Statement of Crude Oil Production and Valuation, All Montana Fields, Year 1954 and Accumulated Totals from Discovery Date (Helena, Montana).

[Total production, 1955-1956] Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1960 Relating to Oil and Gas, vol. 5 (Helena, Montana), p. 1.

[Total production, 1957] Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1961 Relating to Oil and Gas, vol. 6 (Helena, Montana), p. 1.

[Total production, 1958-1960] Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1962 Relating to Oil and Gas, vol. 7 (Helena, Montana), p. 1.

[Total production, 1961] Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1965 Relating to Oil and Gas, vol. 9 (Helena, Montana), p. 1.

[Total production, 1962] Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1966 Relating to Oil and Gas, vol. 10 (Helena, Montana), p. 1.

[Total production, 1963] Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1967 Relating to Oil and Gas, vol. 11 (Helena, Montana), p. 1.

[Total production, 1964-1968] Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1968 Relating to Oil and Gas, vol. 12 (Helena, Montana), p. 1.

[Total production, 1969] Norman J. Beaudry, Executive Secretary, Oil and Gas Conservation Commission of the State of Montana, reply to telephone query (Helena, Montana, April 7, 1970).

^aSweetgrass Arch-Bearpaw Uplift.

^bBig Snowy Uplift.

^cBig Horn Basin.

^dWilliston Basin, discovery in 1951.

^ePowder River Basin, discovery in 1967.

The first well in the Bell Creek field in Powder River County came into production in June 1967. By the end of 1968, there were more than 300 producing wells in the field.⁵⁹ Most wells have had prolific flows and drilling has been easy and relatively inexpensive--a welcome development in Montana where deep, high-cost wells have been the rule. In 1968, Bell Creek became the largest producing field in the Rocky Mountain Area; its output was one-third of total Montana production and was as large as that of the next six fields in the state combined (table 2.9).

Discovery of the Bell Creek field set off one of the biggest exploratory programs in the Rocky Mountain region for many years. As of July 1969, an estimated half billion barrels of oil in Muddy sands (Cretaceous) in the Powder River Basin of Montana and Wyoming had been discovered; 200 million barrels were in the Bell Creek, Montana, field.⁶⁰ Since total cumulative oil production in Montana through 1968 has amounted to only 640 million barrels, the significance of this new field is obvious.⁶¹ In addition to its rank as the largest field yet--indeed the largest in the Rocky Mountain area--Bell Creek also has created increased interest in Montana as an oil-producing state. Because such a large and prolific field remained undiscovered for so long, the possibility of other such "sleepers" in Montana exists.

59. Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1968, Relating to Oil and Gas, vol. 12 (Helena, Montana), p. 8.

60. John C. McCaslin, "Bell Creek Comes of Age," Oil and Gas Journal, vol. 67, no. 30 (July 28, 1969), p. 193.

61. Oil and Gas Conservation Commission of the State of Montana, Statement of Crude Oil Production and Valuation, 1968 (Helena, Montana).

TABLE 2.9
Major Oil Fields, Montana, 1968

<u>Field</u>	<u>County</u>	<u>Year of Discovery</u>	<u>Production, 1968</u>		<u>Average Price</u>
			<u>Barrels</u>	<u>Value</u>	
Bell Creek	Powder River	1967	16,572,472	\$ 43,586,601	\$2.63
Cabin Creek	Fallon	1956	3,530,308	9,037,588	2.56
Cut Bank	Glacier, Toole	1932	3,791,490	9,706,214	2.56
Elk Basin	Carbon	1915	2,611,868	6,686,382	2.56
Lookout Butte	Fallon	1961	1,411,714	3,613,987	2.56
Pennel	Fallon	1955	1,724,725	4,415,296	2.56
Pine	Dawson, Wibaux, Fallon, Prairie	1952	3,823,576	9,941,297	2.60
Total, seven fields			33,466,153	86,987,365	
State total			48,460,246	124,487,807	

Sources: [County and production data for fields; production data for state]
Oil and Gas Conservation Commission of the State of Montana, Statement of Crude
Oil Production and Valuation--All Montana Fields, Year 1968 and Accumulated Totals
from Discovery Date (Helena, Montana).

[Year of discovery] Oil and Gas Conservation Commission of the State of Montana,
Annual Review for the Year 1968 Relating to Oil and Gas, vol. 12 (Helena, Montana),
p. 27.

The proliferation of producing companies, the low-cost transportation provided by pipelines, plus the limited Montana market for refined products has created an interesting pattern of crude oil shipments in and out of Montana. Most of the 1968 production from the Williston and Powder River Basins was shipped by pipeline to midwest refineries. Production from the northern Montana fields (14 percent of the total) went mostly to nearby refineries: Phillips at Great Falls, Union Oil at Cut Bank, and Big West at Kevin.⁶² The Elk Basin in south central Montana and several smaller central Montana fields shipped to the Billings area refineries. Only a small proportion of the total petroleum refined in Billings came from Montana; Wyoming and Canadian fields supplied most of the crude used there (table 2.10). In the end, Montana was a net exporter of crude oil, having produced approximately 48 million barrels (table 2.9) and refined 41 million barrels in 1948 (table 2.10).

The nine refineries operating in Montana are listed in table 2.10. Several small refineries were closed during the 1950s and 1960s, and one might speculate about the prospects of the few small refineries that remain. Almost 90 percent of the oil refined in 1968 was refined in the three refineries at Billings and Laurel. These operations also provide the by-products for the production of elemental sulfur at Billings and Laurel.

The particular qualities of the crude oil available to them force Montana refineries to produce a larger proportion of heavy petroleum products (residual fuel oils, asphalt, etc.) than the typical United States refinery. In the years after 1910, railroads created a demand for fuel oil by

62. Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1968, Relating to Oil and Gas, p. 3.

TABLE 2.10

Oil Refineries in Montana, 1968

Refinery	Location	Barrels of Oil Refined			
		Total	Montana Oil	Wyoming Oil	Canadian Oil
Big West Oil Company of Montana	Kevin	1,290,452	1,290,452	---	---
Continental Oil Company	Billings	13,833,787	1,713,973	4,672,701	7,447,113
Diamond Asphalt Company	Chinook	173,188	173,188	---	---
Farmers Union Central Exchange, Inc.	Laurel	7,796,561	1,263,846	6,532,715	---
Humble Oil and Refining Co.	Billings	14,059,738	1,450,668	12,387,459	221,611
Jet Fuel Refinery	Mosby	30,096	30,096	---	---
Phillips Petroleum Co.	Great Falls	1,689,672	1,689,672	---	---
Tesoro Petroleum Corp.	Wolf Point	819,517	819,517	---	---
Union Oil Company	Cut Bank	1,258,382	1,258,382	---	---
All refineries		40,951,393	9,689,794	23,592,875	7,668,724

Sources: [Barrels of oil refined] Oil and Gas Conservation Commission of the State of Montana, Barrels of Crude Oil Refined in Montana, Calendar Year 1968 (Helena, Montana).

[Location] U.S. Department of the Interior, Bureau of Mines, "Petroleum Refineries in the United States and Puerto Rico, January 1, 1969," Mineral Industry Surveys (Washington, D.C.: U.S. Government Printing Office, 1969), table 2, pp. 7-8.

switching from coal to oil burners; after World War II another shift, from steam to diesel railroad locomotives, greatly reduced this demand for residual fuel oils in Montana. Today, the industrial plants of the Midwest represent the nearest large market for residual fuel oil, and they can be reached only by surface transportation. The market for asphalt, of course, has grown with the interstate highway construction program in Montana.

Other refined products produced in Montana go to eastern Washington (Spokane), to Wyoming, Utah, Colorado, and Nebraska, and to the Dakotas--all via pipeline from Billings. Montana is a net exporter of gasoline, sending approximately one-third of its production out of state. The Montana State Board of Equalization reported that in fiscal 1968, 611.7 million gallons of gasoline were manufactured in the state, 13.7 million gallons were imported and 214.8 million gallons were exported. Gasoline sales in the state amounted to 410.6 million gallons.⁶³ The closing of the Glasgow Air Force Base on July 1, 1968, greatly reduced the demand for jet fuel in Montana.

The charts which picture crude oil production and employment and refinery output and employment show the effects of the substitution of capital for labor in the petroleum industry (figures 2.7 and 2.8). Just as it was in the metal mining industry, 1956 appears to have been the turning point. As if on signal, employment in the oil fields and the refineries began to decline while production continued upward--the result of increased output per worker made possible by the discovery of prolific new producing fields in the Williston Basin and of technological changes.

63. Montana State Board of Equalization, Twenty-Third Biennial Report of the Montana State Board of Equalization for the Period July 1, 1966 to June 30, 1968 (Helena, Montana, 1968), p. 29.

FIGURE 2.7
Crude Oil Production and Employment in Montana
1950-1969



Sources: [Production, 1950-1968] Oil and Gas Conservation Commission of the State of Montana, Statement of Crude Oil Production and Valuation--All Montana Fields, 1950-1968 (Helena, Montana).

[Production, 1969] U.S. Department of the Interior, Bureau of Mines, "The Mineral Industry of Montana in 1969," Mineral Industry Surveys (Washington, D.C.: U.S. Government Printing Office, December 1969), table 1. [Employment, 1950-1969] Employment Security Commission of Montana and U.S. Department of Labor, Bureau of Labor Statistics, "Employees on Montana Nonagricultural Payrolls," Montana Labor Market: Employment Series by Months, Supplement 1 (Helena, Montana), and unpublished data.

FIGURE 2.8
Crude Oil Refined and Employment in Refining
Montana, 1953-1969



Sources: [Crude oil refined, 1953-1968] Oil and Gas Commission of the State of Montana, Barrels of Crude Oil Refined in Montana, 1953-1968 (Helena, Montana).

[Crude oil refined, 1969] Oil and Gas Commission of the State of Montana, Montana Oil and Gas Statistical Bulletin, vol. 18, no. 1 (January 1970).

[Employment, 1953-1969] Employment Security Commission of Montana and U.S. Department of Labor, Bureau of Labor Statistics, "Employees on Montana Nonagricultural Payrolls," Montana Labor Market: Employment Series by Months, Supplement 1 (Helena, Montana), and unpublished data.

Note: Data for crude oil refining not available for years prior to 1953.

It should be noted that at its employment peak, in 1956, Montana's petroleum and gas industry required about 4,000 workers, only 1,000 more than were at work in 1969 (table 2.3). But those 1,000 lost jobs were well-paying jobs, the kind of jobs Montana needs. Refinery workers earned an average of \$8,880 for a year's work in 1968; oil production and field service workers, \$7,505 (table 2.8). For the most part, these jobs provide year-round nonseasonal employment.

From a production standpoint, the outlook for production in Montana probably is brighter than it has ever been. The Oil and Gas Conservation Commission estimated reserves at 452 million barrels on January 1, 1969--approximately 10 years supply at present production rates.⁶⁴ Since January 1969, further discoveries in the Bell Creek field probably have added to this figure. In the meantime, exploration goes on and other discoveries may well occur.

Demand for petroleum products will continue to increase, and Montana refineries should share in the growing market. The outlook for increasing employment, on the other hand, is not so bright. Labor productivity should continue to increase in both petroleum production and refining, although output per production worker depends partly upon the size of future wells. Because of the relatively small number of employees presently involved, the possibility of the oil industry creating many new jobs in Montana in the next few years seems unlikely at this time. The projected employment for 1980 is 3,400--2,300 in production and 1,100 in refining, 400 more than in 1969 (table 2.3).⁶⁵

64. Oil and Gas Conservation Commission of the State of Montana, Annual Review for the Year 1968, Relating to Oil and Gas, p. 27.

65. See "The Montana Economy," Research Report of the Montana Economic Study, pt. 1, chap. 4.

Natural Gas Production

The first natural gas discovery reported in Montana occurred in 1915. For some time, there was little interest in its production; at that time, when gas was discovered in conjunction with oil, it was regarded as a nuisance.

When it became obvious that enough reserves existed to supply Montana markets, further development did take place. Gas from the Kevin-Sunburst field was piped to Shelby in 1923; from the Bowes field to Chinook and Havre in 1926; and from Kevin-Sunburst to Great Falls in 1928. In 1931, a large-diameter gas line was built from the Cut Bank district to the copper smelter at Anaconda.

Gas production increased steadily even through the depression years, except for a decline in 1937 and 1938. Then World War II brought an increased demand from the state's smelting operations. Natural gas production increased fairly steadily until 1950. About this time, proved reserves of gas showed signs of being depleted. Beginning in 1952, The Montana Power Company, the largest producer and distributor in the state, made arrangements to import gas from Canada; the firm also brings in gas from Wyoming. The Montana-Dakota Utilities Company, the other major distributor in the state, imports gas from both Wyoming and North Dakota. With a supply assured, service to Montana communities has been expanded until gas now is available in most of the state.

Since 1951, natural gas production in Montana usually has ranged between 20 and 30 billion cubic feet. In 1969, production amounted to 23.8 billion cubic feet, valued at \$2.4 million (table 2.1). Three fields--Cut Bank in Glacier and Toole Counties, Cedar Creek in Fallon and Wibaux, and Keith Block in Liberty--produced approximately half the total output.

The production in the state probably represented less than one-third of total consumption. Liquefied petroleum gases--propane and butane--are produced at natural gas processing plants and at oil refineries, but are not of any great importance.

One major gas field, the Tiger Ridge, was discovered in Blaine County in 1967. It is described as the biggest gas discovery since 1930. Ironically, its development has been delayed because of lack of markets. An announcement in 1969 indicated that gas from Tiger Ridge would be piped to Saskatchewan, Canada, to connect with a major line supplying gas to Minnesota.⁶⁶ As of June 1970, this development was awaiting approval from the Federal Power Commission and Canadian authorities.

While Montana is unlikely to suffer any shortage of natural gas in the foreseeable future, the prospects for developing additional supplies within the state do not appear good. Separate employment figures are not available for natural gas production; they are included in the data for petroleum production which appear in table 2.3 and which were discussed in the preceding section.

Other Mineral Industries

The development of metal mining has been discussed; the potential use of Montana's huge coal resources has been considered; and petroleum and natural gas have received some attention in this paper. But there is another group of minerals--nonmetallic and nonfuel--produced in Montana which needs to be mentioned.

66. U.S. Department of the Interior, "The Mineral Industry of Montana in 1969," p. 10.

Combined, these nonmetallic mining operations produced \$46 million worth of minerals in 1969. They employ only about 700 to 900 workers, but they help provide the basis for an additional 1,300 jobs in plants which process their products (tables 2.3 and 2.11). For the most part, annual earnings in the nonmetallic metal industries are high, well above the 1968 state rate of \$5,579 for all workers covered by unemployment insurance. Seasonal patterns vary considerably, from chemical plants which operate year-round to very seasonal operations, such as sand and gravel producers and ready-mix concrete firms.

The largest employer among the nonmetallic mining operations is the chemical and fertilizer minerals group, with a total of 478 employees in 1968. In Montana, this group largely comprises fluorspar and phosphate rock mines. Another 363 persons were employed that year in chemical plants mostly concerned with phosphate products (table 2.11).

Fluorspar (metallurgical grade) was first produced in significant quantities in 1952 from a deposit in Ravalli County. It is milled at Darby and shipped to out-of-state industrial plants. Production data are available for only a few years.

Phosphate rock production in Montana has declined considerably in recent years, according to the U.S. Bureau of Mines. Production estimates for the state are not published. The Stauffer Chemical Company's elemental phosphorus plant at Silver Bow once used phosphate rock from Melrose; now its rock comes from Idaho. From 1963 to 1968, Cominco American (formerly Montana Phosphate Products Company) produced phosphate rock near Hall. In 1969, only the Cominco mines near Garrison were in operation; the rock was shipped to consumers in the Rocky Mountain area and to Trail, British Columbia, for manufacture into fertilizer.

TABLE 2.11

Employment and Earnings in Montana's Nonmetallic Mineral Industries
1968

<u>Industry</u>	<u>Average Monthly Employment</u>	<u>Average Earnings (Annual Rate)</u>
Mining and quarrying of nonmetallic minerals except fuels	947	\$7,288
Crushed and broken stone	36	7,476
Sand and gravel	127	6,456
Clay, ceramic, and refractory minerals	34	8,744
Chemical and fertilizer mineral mining ^a	478	7,325
Miscellaneous nonmetallic minerals and services ^b	272	7,402
Chemicals and allied products	363	7,294
Industrial inorganic and organic chemicals ^c	278	7,735
All other chemicals	85	5,852
Stone, clay, glass, and concrete products	983	6,597
Cement, hydraulic	221	7,634
Concrete, gypsum, and plaster products ^d	666	6,464
All other stone, clay, glass, and concrete products	96	5,139

Source: Employment Security Commission of Montana, unpublished data (Helena, Montana).

Note: Wage and salary workers only.

^aIncludes fluorspar and phosphate rock.

^bIncludes gypsum, talc, and vermiculite.

^cIncludes elemental phosphorus and sulfur.

^dIncludes concrete block and brick, other concrete products, ready-mix concrete, and lime.

For a number of years, Rocky Mountain Phosphates, Inc., in plants at Butte and later at Garrison, has produced a defluorinated phosphate product used as an animal feed supplement. Severe pollution problems have involved the company in litigation and intermittent shutdowns since its establishment. Until 1960, The Anaconda Company produced phosphate fertilizer at Anaconda; rock for this plant came from Idaho.

The preliminary 1969 estimate places Montana production of sand, gravel, and stone at 20 million tons valued at \$21.3 million (table 2.1); employment in 1968 amounted to only 163, and these workers are scattered widely around the state (table 2.11). Several manufacturing industries classified as stone, clay, glass, and concrete products utilize sand, gravel, or stone resources.

The interstate highway program and the construction of several large dams have required large quantities of sand, gravel, and stone produced in the state in recent years. Because of the cost of transportation and the abundance of resources there are many small local producers; major markets generally are served from nearby deposits.

Limestone, included in the sand, gravel, and stone production figures, is one of the most widely used of all rocks. In Montana it is used for concrete aggregate, roadstone, flux, agricultural lime, railroad ballast, riprap, fill material, and filler. Two cement plants--at Trident and Montana City--produce limestone for use in their own operations. The Anaconda Company produces lime from limestone for metallurgical use and water treatment and Montana's three sugar plants produce lime for use in sugar refining.

Montana has what may be the largest reserve of steatite grade talc (the purest of the common commercial grades) in the United States. Talc

has been produced in Montana for many years; in 1969, it was mined by Charles Pfizer & Company in Beaverhead and Madison Counties, and ground and sized at the company grinding plant at Barratts, south of Dillon. Also, the United Sierra Division of Cyprus Mines Corporation processed talc from Madison County mines at Three Forks.

Shortly after World War I, the Zonolite Company began mining vermiculite in Lincoln County, near Libby. Zonolite, now a division of W. R. Grace & Company, still operates an open-pit mine there which supplies most of the vermiculite produced in the United States. Vermiculite is used for insulating and fireproofing and in lawn, garden, and agricultural products.

Among other nonmetallic minerals which have been or are being produced in small amounts are barite (produced near Greenough from 1951 to 1967); various clays; gem stones (especially sapphires); and gypsum (currently produced by U.S. Gypsum in Fergus County). No commercial deposits of native sulphur are known in Montana, but sulfuric acid is produced as a by-product by The Anaconda Company and elemental sulfur is produced in Billings and Laurel as a by-product of petroleum refining.

At the national level, nonmetallic minerals is the only mining group expected to increase its employment between 1968 and 1980. The anticipated increase in employment is put at 14 percent, while output is expected to expand by two-thirds.⁶⁷ Nevertheless, prospects for expansion and increased employment in Montana's nonmetallic minerals in the next ten years seem slight. As stated in the section on coal production, the Montana Economic Study predicts that combined employment in coal and other nonmetallic

67. Al-Samarrie, Economic Projections to 1980: Growth Patterns for the Coming Decade, tables 6-4 and 6-8, pp. S-62 and S-70.

minerals will rise to 1,200 in 1980. The projected increase amounts to only 400 new jobs; most of them are expected to be in coal production.

The outlook for the state's largest nonmetallic mineral employer--the chemical and fertilizer mineral industry (mostly phosphate rock)--is not particularly bright. Montana's huge reserves of phosphate rock probably must await further development. Three-fourths of the United States production of phosphate rock is produced in Florida, which, at present output rates, has reserves enough for 30 years. Three-fourths of United States output of phosphate goes into agricultural chemicals and fertilizers. The fertilizer market in 1968 and 1969 suffered from excess capacity which caused curtailment of several mining operations in Montana and Idaho. Fertilizers face additional uncertainties because of the growing concern with their effect on the ecosystem.

Some commercial use has been made of bentonite beds in northeastern Montana and further development is underway near Glasgow. Bentonite is a type of clay which swells when wet; one of its uses is as a watertight seal in irrigation ditches, dam foundations, and drill holes. Like Montana's coal resources, bentonite will be strip mined. At the present time, no legislation exists requiring reclamation of land stripped for bentonite; conservationists will propose such legislation during the 1971 legislative session.

Other nonmetallic minerals either have little prospects for growth at this time or are too small to be important in the total industry employment picture. There may well come a day when more of Montana's nonmetallic minerals can be exploited economically, but that day appears now to be some time away.

The Overall Outlook

This chapter has looked at metal mining, coal mining, petroleum production, and nonmetallic minerals, as well as the processing industries based upon these products. They are important industries from the standpoint of output: the value of minerals produced in 1969 was approximately \$285 million. (No estimate of the value added by processing is available.) They are key industries from the standpoint of employment because they provide primary employment which creates other jobs in industries such as trade and services. And, the mineral industries provide good jobs, well-paying jobs--the kind Montana needs more of.

The chances are good that there will be more employment in these industries in 1980 than in 1970. Possibilities of expansion are especially good in metal mining--should one or more of several possible new copper mining properties be developed--and in coal mining, as Montana's coal resources come into their own as a source of fuel for power generating plants. (At the present time, employment in the state's coal industry is an exception to the high-pay rule of the industry in general.)

But even with the hoped-for new developments, total employment in these industries--metal mining and smelting and refining, oil and gas production and oil refining, coal, and other nonmetallic minerals--is expected to increase less than 10 percent, adding only about 1,000 new jobs during the 1970s. This means a monthly average of 12,800 workers in 1980 compared to 11,800 in 1969.⁶⁸ Nevertheless, the estimate for 1980

68. See "The Montana Economy," Research Report of the Montana Economic Study, pt. 1, chap. 4.

signifies a welcome potential change in direction for the minerals industries-- from a primary industry group whose employment is declining, to one which is providing more jobs for Montana workers.

